Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 1

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t)=u(2,t)=0 & 0 \le t \\ u(x,0) = \begin{cases} -3x & 0 \le x \le 1 \\ 3x-6 & 1 \le x \le 2 \end{cases} & 0 \le x \le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=\frac{7}{5}$

and the moment $t=0.6$ by means of a Fourier series of order 12 .

1) $u\left(\frac{7}{5}, 0.6\right) = -3.38388$

2) $u\left(\frac{7}{5}, 0.6\right) = 3.07186$

3) $u\left(\frac{7}{5}, 0.6\right) = -3.66251$

4) $u\left(\frac{7}{5}, 0.6\right) = -1.01558\times 10^{-10}$

5) $u\left(\frac{7}{5}, 0.6\right) = -8.30552$

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0 \le t \\ u(x,0) = \begin{cases} -x & 0 \le x \le 1 \\ 6x-7 & 1 \le x \le 2 \\ -\frac{5x}{\pi-2}+\frac{10}{\pi-2}+5 & 2 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = -\left((x-1)\,x\,(x-\pi)^2\right) & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x=2$

and the moment $t=0.9$ by means of a Fourier series of order 11 .

1) $u(2, 0.9) = 1.55028$

2) $u(2, 0.9) = -1.61245$

3) $u(2, 0.9) = -0.303755$

4) $u(2, 0.9) = 8.43289$

5) $u(2, 0.9) = -0.874755$

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 2

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=-\left((x-3)(x-2)x^2(x-\pi)^2\right) & 0\le x\le\pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.4 by means of a Fourier series of order 12 .

1) u(1,0.4) = 5.11108

2) u(1,0.4) = 6.67833

3) u(1,0.4) = -1.74354

4) u(1,0.4) = -0.815826

5) u(1,0.4) = 5.55431

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(3,t)=0 & 0\le t \\ u(x,0)=3(x-3)^2(x-1)x^2 & 0\le x\le 3 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.2 by means of a Fourier series of order 9 .

1) u(1,0.2) = 3.1908

2) u(1,0.2) = -0.942323

3) u(1,0.2) = 3.979

4) u(1,0.2) = -0.95758

5) u(1,0.2) = 0.33488

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 3

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ u(0,t)=u(5,t)=0 & 0\le t \\ u(x,0)=2\,(x-5)^2\,(x-1)\,x^2 & 0\le x\le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 4
and the moment t= 0.4 by means of a Fourier series of order 10 .

1) u(4 , 0.4) = 14.9873

2) u(4 , 0.4) = 7.57727

3) u(4 , 0.4) = 5.39763

4) u(4 , 0.4) = 3.92912

5) u(4 , 0.4) = -6.39456

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -\frac{5x}{3} & 0\le x\le 3 \\ \frac{5x}{\pi-3}-\frac{15}{\pi-3}-5 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ \frac{\partial}{\partial t}u(x,0)=\begin{cases} 8x & 0\le x\le 1 \\ -\frac{8x}{\pi-1}+\frac{8}{\pi-1}+8 & 1\le x\le \pi \end{cases} & 0.\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 1
and the moment t= 0.8 by means of a Fourier series of order 9 .

1) u(1 , 0.8) = 5.94216

2) u(1 , 0.8) = 2.88336

3) u(1 , 0.8) = 2.13768

4) u(1 , 0.8) = 4.98318

5) u(1 , 0.8) = 8.11306

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 4

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -2x & 0 \le x \le 3 \\ \frac{6x}{\pi-3} - \frac{18}{\pi-3} - 6 & 3 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 1$ and the moment $t = 0.9$ by means of a Fourier series of order 12.

1) $u(1, 0.9) = -7.78968$

2) $u(1, 0.9) = -5.67572 \times 10^{-10}$

3) $u(1, 0.9) = -4.77518$

4) $u(1, 0.9) = 2.08331$

5) $u(1, 0.9) = -4.82299$

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t) = u(4,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 2x & 0 \le x \le 2 \\ 8 - 2x & 2 \le x \le 4 \end{cases} & 0 \le x \le 4 \\ \frac{\partial}{\partial t}u(x,0) = \begin{cases} -\frac{7x}{2} & 0 \le x \le 2 \\ 16x - 39 & 2 \le x \le 3 \\ 36 - 9x & 3 \le x \le 4 \end{cases} & 0. \le x \le 4 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x = 1$ and the moment $t = 0.4$ by means of a Fourier series of order 9.

1) $u(1, 0.4) = 2.88226$

2) $u(1, 0.4) = 5.78434$

3) $u(1, 0.4) = 0.290312$

4) $u(1, 0.4) = 7.61393$

5) $u(1, 0.4) = -2.76143$

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 5

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ u(0,t) = u(5,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -\frac{8x}{3} & 0 \le x \le 3 \\ 4x - 20 & 3 \le x \le 5 \end{cases} & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x = 4
and the moment t = 0.4 by means of a Fourier series of order 10 .

1) u(4 , 0.4) = 2.7966

2) u(4 , 0.4) = −3.60583

3) u(4 , 0.4) = 2.07023

4) u(4 , 0.4) = 7.77069

5) u(4 , 0.4) = 2.62051

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 2x & 0 \le x \le 2 \\ -\frac{4x}{\pi-2} + \frac{8}{\pi-2} + 4 & 2 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x = 2
and the moment t = 0.2 by means of a Fourier series of order 8 .

1) u(2 , 0.2) = 0.00640819

2) u(2 , 0.2) = −3.91831

3) u(2 , 0.2) = −4.63252

4) u(2 , 0.2) = 2.13257

5) u(2 , 0.2) = 2.65926

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 6

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t)=u(2,t)=0 & 0\le t \\ u(x,0)=-(x-2)^2(x-1)x^2 & 0\le x\le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=\frac{8}{5}$

and the moment $t=0.2$ by means of a Fourier series of order 9 .

1) $u\left(\frac{8}{5}, 0.2\right) = -5.30428$

2) $u\left(\frac{8}{5}, 0.2\right) = 7.12691$

3) $u\left(\frac{8}{5}, 0.2\right) = 5.56414$

4) $u\left(\frac{8}{5}, 0.2\right) = 0$

5) $u\left(\frac{8}{5}, 0.2\right) = -0.756228$

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -x & 0\le x\le 2 \\ 8-5x & 2\le x\le 3 \\ \frac{7x}{\pi-3}-\frac{21}{\pi-3}-7 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ \frac{\partial}{\partial t}u(x,0)=3(x-1)x(x-\pi)^2 & 0.\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x=2$

and the moment $t=0.2$ by means of a Fourier series of order 12 .

1) $u(2, 0.2) = -5.92808$

2) $u(2, 0.2) = 3.1985$

3) $u(2, 0.2) = -8.60175$

4) $u(2, 0.2) = 6.06592$

5) $u(2, 0.2) = -0.82046$

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 7

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ u(0,t)=u(1,t)=0 & 0\le t \\ u(x,0)=3\,(x-1)\left(x-\frac{1}{5}\right)x & 0\le x\le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=\frac{9}{10}$ and the moment $t=0.3$ by means of a Fourier series of order 10 .

1) $u\left(\frac{9}{10}, 0.3\right) = 5.48906$

2) $u\left(\frac{9}{10}, 0.3\right) = -5.1557\times 10^{-7}$

3) $u\left(\frac{9}{10}, 0.3\right) = 5.44783$

4) $u\left(\frac{9}{10}, 0.3\right) = 6.60163$

5) $u\left(\frac{9}{10}, 0.3\right) = 3.72816$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -3x & 0\le x\le 1 \\ \frac{3x}{\pi-1}-\frac{3}{\pi-1}-3 & 1\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$ and the moment $t=0.2$ by means of a Fourier series of order 8 .

1) $u(1, 0.2) = -1.5018$

2) $u(1, 0.2) = 3.05632$

3) $u(1, 0.2) = 1.58776$

4) $u(1, 0.2) = 0.947156$

5) $u(1, 0.2) = 2.27169$

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 8

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=-\left((x-1)\,x\,(x-\pi)^2\right) & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.4 by means of a Fourier series of order 9 .

1) u(2 , 0.4) = 7.72426

2) u(2 , 0.4) = -2.63295

3) u(2 , 0.4) = -2.89083

4) u(2 , 0.4) = -0.263495

5) u(2 , 0.4) = 1.19739

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(3,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 7x & 0\le x\le 1 \\ 15-8x & 1\le x\le 2 \\ x-3 & 2\le x\le 3 \end{cases} & 0\le x\le 3 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.7 by means of a Fourier series of order 11 .

1) u(1 , 0.7) = 0.828779

2) u(1 , 0.7) = -4.28963

3) u(1 , 0.7) = 0.133154

4) u(1 , 0.7) = -1.82114

5) u(1 , 0.7) = 2.05641

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 9

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 4x & 0 \le x \le 1 \\ 3x+1 & 1 \le x \le 2 \\ -\frac{7x}{\pi-2} + \frac{14}{\pi-2} + 7 & 2 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.6 by means of a Fourier series of order 10 .

1) u(2 , 0.6) = 0.675949

2) u(2 , 0.6) = 8.58555

3) u(2 , 0.6) = -5.59146

4) u(2 , 0.6) = 0.0239099

5) u(2 , 0.6) = 1.65502

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -3x & 0 \le x \le 1 \\ \frac{3x}{\pi-1} - \frac{3}{\pi-1} - 3 & 1 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.6 by means of a Fourier series of order 10 .

1) u(2 , 0.6) = -4.62715

2) u(2 , 0.6) = -2.40536

3) u(2 , 0.6) = 1.63071

4) u(2 , 0.6) = -1.48133

5) u(2 , 0.6) = -0.272154

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 10

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=(x-3)(x-1)\,x\,(x-\pi)^2 & 0\le x\le\pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.8 by means of a Fourier series of order 11 .

1) u(1 , 0.8) = -4.41119

2) u(1 , 0.8) = -6.6851

3) u(1 , 0.8) = 1.33896

4) u(1 , 0.8) = -5.13403

5) u(1 , 0.8) = -0.0404162

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -\frac{x}{2} & 0\le x\le 2 \\ \frac{x}{\pi-2}-\frac{2}{\pi-2}-1 & 2\le x\le\pi \end{cases} & 0\le x\le\pi \\ \frac{\partial}{\partial t}u(x,0)=\begin{cases} -x & 0\le x\le 1 \\ \frac{x}{\pi-1}-\frac{1}{\pi-1}-1 & 1\le x\le\pi \end{cases} & 0.\le x\le\pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 1
and the moment t= 1. by means of a Fourier series of order 10 .

1) u(1 , 1.) = 1.79577

2) u(1 , 1.) = 3.11527

3) u(1 , 1.) = 8.15689

4) u(1 , 1.) = -3.66521

5) u(1 , 1.) = -0.0775097

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 11

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -x & 0\le x\le 2 \\ 8-5x & 2\le x\le 3 \\ \frac{7x}{\pi-3}-\frac{21}{\pi-3}-7 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=2$ and the moment $t=0.8$ by means of a Fourier series of order 10 .

1) $u(2, 0.8) = 4.88257$

2) $u(2, 0.8) = -1.19788$

3) $u(2, 0.8) = -6.46457\times 10^{-6}$

4) $u(2, 0.8) = -0.849051$

5) $u(2, 0.8) = -3.3919$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -4x & 0\le x\le 1 \\ -x-3 & 1\le x\le 2 \\ \frac{5x}{\pi-2}-\frac{10}{\pi-2}-5 & 2\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$ and the moment $t=0.7$ by means of a Fourier series of order 9 .

1) $u(1, 0.7) = -1.60434$

2) $u(1, 0.7) = 1.1892$

3) $u(1, 0.7) = 0.521932$

4) $u(1, 0.7) = 0.291703$

5) $u(1, 0.7) = -2.98942$

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 12

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -9x & 0\le x\le 1 \\ \frac{9x}{\pi-1}-\frac{9}{\pi-1}-9 & 1\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.6 by means of a Fourier series of order 10 .

1) u(2 , 0.6) = -1.5539

2) u(2 , 0.6) = -8.66491

3) u(2 , 0.6) = -0.000435566

4) u(2 , 0.6) = -6.48636

5) u(2 , 0.6) = -6.72479

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(5,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -\frac{x}{3} & 0\le x\le 3 \\ \frac{x}{2}-\frac{5}{2} & 3\le x\le 5 \end{cases} & 0\le x\le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 4
and the moment t= 0.2 by means of a Fourier series of order 10 .

1) u(4 , 0.2) = 2.47748

2) u(4 , 0.2) = 3.01623

3) u(4 , 0.2) = 2.53901

4) u(4 , 0.2) = -0.522824

5) u(4 , 0.2) = -4.17438

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 13

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=2\,(x-1)\,x\,(x-\pi) & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.2 by means of a Fourier series of order 9 .

1) u(2 , 0.2) = −7.73585

2) u(2 , 0.2) = 3.13808

3) u(2 , 0.2) = −0.107756

4) u(2 , 0.2) = 4.53022

5) u(2 , 0.2) = 3.63693

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ u(0,t)=u(1,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 60\,x & 0\le x\le \frac{1}{10} \\ 20-140\,x & \frac{1}{10}\le x\le \frac{1}{5} \\ 10\,x-10 & \frac{1}{5}\le x\le 1 \end{cases} & 0\le x\le 1 \\ \frac{\partial}{\partial t}u(x,0) = -3\,(x-1)\left(x-\frac{3}{10}\right)\left(x-\frac{1}{10}\right)x & 0.\le x\le 1 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= $\frac{1}{10}$
and the moment t= 0.1 by means of a Fourier series of order 8 .

1) u($\frac{1}{10}$, 0.1) = 2.73897

2) u($\frac{1}{10}$, 0.1) = 3.27652

3) u($\frac{1}{10}$, 0.1) = 0.971827

4) u($\frac{1}{10}$, 0.1) = −5.27863

5) u($\frac{1}{10}$, 0.1) = −4.80909

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EDP-01 for serial number: 14

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -x & 0 \le x \le 1 \\ 5x-6 & 1 \le x \le 2 \\ -\frac{4x}{\pi-2} + \frac{8}{\pi-2} + 4 & 2 \le x \le \pi \\ 0 & \text{True} \end{cases} & 0 \le x \le \pi \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.2 by means of a Fourier series of order 8 .

1) u(1 , 0.2) = 0.23636

2) u(1 , 0.2) = -7.85146

3) u(1 , 0.2) = -7.77485

4) u(1 , 0.2) = 6.75614

5) u(1 , 0.2) = -2.8286

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(3,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -x & 0 \le x \le 1 \\ 2x-3 & 1 \le x \le 2 \\ 3-x & 2 \le x \le 3 \\ 0 & \text{True} \end{cases} & 0 \le x \le 3 \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 1. by means of a Fourier series of order 8 .

1) u(2 , 1.) = 2.07378

2) u(2 , 1.) = 1.8126

3) u(2 , 1.) = 0.000015722

4) u(2 , 1.) = -4.16633

5) u(2 , 1.) = 0.835338

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 15

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 3x & 0\le x\le 3 \\ -\frac{9x}{\pi-3}+\frac{27}{\pi-3}+9 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.6 by means of a Fourier series of order 8 .

1) u(2 , 0.6) = 7.68876

2) u(2 , 0.6) = 0.00036828

3) u(2 , 0.6) = 4.62837

4) u(2 , 0.6) = 4.66209

5) u(2 , 0.6) = 1.51416

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=(x-3)(x-2)x^2(x-\pi)^2 & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.7 by means of a Fourier series of order 9 .

1) u(2 , 0.7) = -4.84068

2) u(2 , 0.7) = 2.37758

3) u(2 , 0.7) = 3.13624

4) u(2 , 0.7) = -1.12844

5) u(2 , 0.7) = -4.98738

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 16

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} \frac{4x}{3} & 0\le x\le 3 \\ -\frac{4x}{\pi-3}+\frac{12}{\pi-3}+4 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x = 1
and the moment t = 0.9 by means of a Fourier series of order 11 .

1) u (1 , 0.9) = 1.24657×10^{-6}

2) u (1 , 0.9) = 3.29973

3) u (1 , 0.9) = 7.45885

4) u (1 , 0.9) = -2.01698

5) u (1 , 0.9) = -5.51777

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(1,t)=0 & 0\le t \\ u(x,0)=(x-1)\left(x-\frac{1}{5}\right)x^2 & 0\le x\le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x = $\frac{3}{5}$
and the moment t = 0.9 by means of a Fourier series of order 12 .

1) u ($\frac{3}{5}$, 0.9) = -0.0333333

2) u ($\frac{3}{5}$, 0.9) = -1.59038

3) u ($\frac{3}{5}$, 0.9) = -1.10033

4) u ($\frac{3}{5}$, 0.9) = 1.32086

5) u ($\frac{3}{5}$, 0.9) = -3.66562

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 17

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 25 \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t) = u(2,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 6x & 0 \le x \le 1 \\ 12 - 6x & 1 \le x \le 2 \end{cases} & 0 \le x \le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = \frac{3}{2}$ and the moment $t = 0.8$ by means of a Fourier series of order 9 .

1) $u\left(\frac{3}{2}, 0.8\right) = 1.29988$

2) $u\left(\frac{3}{2}, 0.8\right) = 5.6026$

3) $u\left(\frac{3}{2}, 0.8\right) = 0$

4) $u\left(\frac{3}{2}, 0.8\right) = 4.61292$

5) $u\left(\frac{3}{2}, 0.8\right) = 4.68073$

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 4 \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -x & 0 \le x \le 1 \\ \frac{x}{\pi-1} - \frac{1}{\pi-1} - 1 & 1 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ \frac{\partial}{\partial t} u(x,0) = \begin{cases} -8x & 0 \le x \le 1 \\ 17x - 25 & 1 \le x \le 2 \\ -\frac{9x}{\pi-2} + \frac{18}{\pi-2} + 9 & 2 \le x \le \pi \end{cases} & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x = 1$ and the moment $t = 1.$ by means of a Fourier series of order 11 .

1) $u(1, 1.) = -7.92645$

2) $u(1, 1.) = 1.83855$

3) $u(1, 1.) = -2.68272$

4) $u(1, 1.) = -5.14295$

5) $u(1, 1.) = 7.52021$

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EDP-01 for serial number: 18

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ u(0,t)=u(3,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 8x & 0\le x\le 1 \\ 12-4x & 1\le x\le 3 \end{cases} & 0\le x\le 3 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.3 by means of a Fourier series of order 8 .

1) u(1 , 0.3) = 0.0283178

2) u(1 , 0.3) = 7.10309

3) u(1 , 0.3) = 5.69885

4) u(1 , 0.3) = -3.38656

5) u(1 , 0.3) = 0.570121

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ u(0,t)=u(5,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -\frac{9x}{2} & 0\le x\le 2 \\ \frac{5x}{2}-14 & 2\le x\le 4 \\ 4x-20 & 4\le x\le 5 \end{cases} & 0\le x\le 5 \\ \frac{\partial}{\partial t}u(x,0)=\begin{cases} -8x & 0\le x\le 1 \\ -x-7 & 1\le x\le 2 \\ 3x-15 & 2\le x\le 5 \end{cases} & 0.\le x\le 5 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 4
and the moment t= 0.6 by means of a Fourier series of order 10 .

1) u(4 , 0.6) = 2.66471

2) u(4 , 0.6) = 6.29193

3) u(4 , 0.6) = -1.08334

4) u(4 , 0.6) = 7.13053

5) u(4 , 0.6) = -5.35081

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 19

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t)=u(4,t)=0 & 0\le t \\ u(x,0)=-(x-4)^2(x-1)x & 0\le x\le 4 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.5 by means of a Fourier series of order 9 .

1) u(1 , 0.5) = -2.5204

2) u(1 , 0.5) = 4.58933

3) u(1 , 0.5) = 3.55925

4) u(1 , 0.5) = -0.0019012

5) u(1 , 0.5) = 6.84878

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t)=u(4,t)=0 & 0\le t \\ u(x,0)=-3(x-4)(x-2)x & 0\le x\le 4 \\ \frac{\partial}{\partial t}u(x,0)=\begin{cases} -8x & 0\le x\le 1 \\ \frac{8x}{3}-\frac{32}{3} & 1\le x\le 4 \end{cases} & 0.\le x\le 4 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 3
and the moment t= 0.4 by means of a Fourier series of order 11 .

1) u(3 , 0.4) = 0.756349

2) u(3 , 0.4) = -4.2899

3) u(3 , 0.4) = -7.73235

4) u(3 , 0.4) = 2.96945

5) u(3 , 0.4) = 7.8466

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 20

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} \frac{x}{2} & 0 \le x \le 2 \\ 2x-3 & 2 \le x \le 3 \\ -\frac{3x}{\pi-3} + \frac{9}{\pi-3} + 3 & 3 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$ and the moment $t=0.2$ by means of a Fourier series of order 9.

1) u(1, 0.2) = −7.32307

2) u(1, 0.2) = 0.520476

3) u(1, 0.2) = 1.09239

4) u(1, 0.2) = 7.82344

5) u(1, 0.2) = 8.6156

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -9x & 0 \le x \le 1 \\ 8x-17 & 1 \le x \le 2 \\ \frac{x}{\pi-2} - \frac{2}{\pi-2} - 1 & 2 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$ and the moment $t=0.6$ by means of a Fourier series of order 9.

1) u(1, 0.6) = 3.52019

2) u(1, 0.6) = 3.10012

3) u(1, 0.6) = −4.27712

4) u(1, 0.6) = −2.46604

5) u(1, 0.6) = −3.33131

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 21

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -x & 0\le x\le 1 \\ \frac{x}{\pi-1}-\frac{1}{\pi-1}-1 & 1\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.1 by means of a Fourier series of order 10 .

1) u(1 , 0.1) = -5.53154

2) u(1 , 0.1) = -2.818

3) u(1 , 0.1) = -0.133827

4) u(1 , 0.1) = 7.59563

5) u(1 , 0.1) = 5.06097

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(4,t)=0 & 0\le t \\ u(x,0)=3(x-4)^2(x-2)(x-1)x^2 & 0\le x\le 4 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 3
and the moment t= 1. by means of a Fourier series of order 10 .

1) u(3 , 1.) = -4.0482

2) u(3 , 1.) = 3.86538

3) u(3 , 1.) = 0.185041

4) u(3 , 1.) = -3.11604

5) u(3 , 1.) = 14.6835

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 22

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=-2\,(x-2)\,x\,(x-\pi)^2 & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.6 by means of a Fourier series of order 10 .

1) u(2 , 0.6) = −5.67526

2) u(2 , 0.6) = 0.000317165

3) u(2 , 0.6) = 2.41329

4) u(2 , 0.6) = 5.22621

5) u(2 , 0.6) = 5.40698

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(5,t)=0 & 0\le t \\ u(x,0)=2\,(x-5)\,(x-4)\,(x-3)\,x & 0\le x\le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.5 by means of a Fourier series of order 8 .

1) u(1 , 0.5) = −17.4186

2) u(1 , 0.5) = −4.5694

3) u(1 , 0.5) = −1.27868

4) u(1 , 0.5) = −0.270107

5) u(1 , 0.5) = −2.71374

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 23

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = (x-1)\,x\,(x-\pi) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.7 by means of a Fourier series of order 12 .

1) u(2 , 0.7) = -6.34781

2) u(2 , 0.7) = 6.0128

3) u(2 , 0.7) = 0.659625

4) u(2 , 0.7) = 1.94355

5) u(2 , 0.7) = -0.72533

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t) = u(4,t) = 0 & 0 \le t \\ u(x,0) = -(x-4)^2\,(x-2)\,x & 0 \le x \le 4 \\ \frac{\partial}{\partial t}u(x,0) = -3\,(x-4)^2\,(x-3)\,(x-2)\,x^2 & 0. \le x \le 4 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 2
and the moment t= 0.9 by means of a Fourier series of order 11 .

1) u(2 , 0.9) = 1.93468

2) u(2 , 0.9) = -10.5382

3) u(2 , 0.9) = -4.9868

4) u(2 , 0.9) = -6.82367

5) u(2 , 0.9) = -5.67266

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EDP-01 for serial number: 24

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -x & 0\le x\le 1 \\ \frac{x}{\pi-1}-\frac{1}{\pi-1}-1 & 1\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.6 by means of a Fourier series of order 8 .

1) u(2 , 0.6) = 1.30069

2) u(2 , 0.6) = -0.377562

3) u(2 , 0.6) = -3.18347

4) u(2 , 0.6) = 2.87261

5) u(2 , 0.6) = 4.77287

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(1,t)=0 & 0\le t \\ u(x,0)=(x-1)\left(x-\frac{3}{5}\right)\left(x-\frac{1}{5}\right)x & 0\le x\le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= $\frac{1}{5}$
and the moment t= 0.1 by means of a Fourier series of order 8 .

1) u($\frac{1}{5}$, 0.1) = -0.00333333

2) u($\frac{1}{5}$, 0.1) = -2.48834

3) u($\frac{1}{5}$, 0.1) = -3.55571

4) u($\frac{1}{5}$, 0.1) = 2.43829

5) u($\frac{1}{5}$, 0.1) = -0.741341

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EDP-01 for serial number: 25

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ u(0,t) = u(3,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 4x & 0 \le x \le 1 \\ 6-2x & 1 \le x \le 3 \end{cases} & 0 \le x \le 3 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.5 by means of a Fourier series of order 9 .

1) u(2 , 0.5) = 3.25934

2) u(2 , 0.5) = 1.50469

3) u(2 , 0.5) = 5.44976

4) u(2 , 0.5) = -4.54411

5) u(2 , 0.5) = -6.56162

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(2,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -9x & 0 \le x \le 1 \\ 9x-18 & 1 \le x \le 2 \end{cases} & 0 \le x \le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= $\frac{11}{10}$
and the moment t= 1. by means of a Fourier series of order 10 .

1) u($\frac{11}{10}$, 1.) = -4.5

2) u($\frac{11}{10}$, 1.) = -0.754179

3) u($\frac{11}{10}$, 1.) = 3.18552

4) u($\frac{11}{10}$, 1.) = 3.40567

5) u($\frac{11}{10}$, 1.) = 1.61686

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 26

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ u(0,t)=u(5,t)=0 & 0\le t \\ u(x,0)=-(x-5)^2(x-3)(x-1)x^2 & 0\le x\le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=4$
and the moment $t=0.4$ by means of a Fourier series of order 8 .

1) u (4 , 0.4) = 0.397493

2) u (4 , 0.4) = −0.364002

3) u (4 , 0.4) = −1.18704

4) u (4 , 0.4) = 0.202114

5) u (4 , 0.4) = −6.01827

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 4x & 0\le x\le 2 \\ -\frac{8x}{\pi-2}+\frac{16}{\pi-2}+8 & 2\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$
and the moment $t=0.4$ by means of a Fourier series of order 10 .

1) u (1 , 0.4) = −1.5221

2) u (1 , 0.4) = 3.9991

3) u (1 , 0.4) = 0.188309

4) u (1 , 0.4) = 1.31439

5) u (1 , 0.4) = 3.15886

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EDP-01 for serial number: 27

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 9x & 0 \le x \le 1 \\ 13 - 4x & 1 \le x \le 2 \\ -\frac{5x}{\pi-2} + \frac{10}{\pi-2} + 5 & 2 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x = 2 and the moment t = 0.6 by means of a Fourier series of order 12 .

1) u(2 , 0.6) = 3.45882

2) u(2 , 0.6) = 1.95692

3) u(2 , 0.6) = -1.86238

4) u(2 , 0.6) = -0.431483

5) u(2 , 0.6) = -6.18739

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(5,t) = 0 & 0 \le t \\ u(x,0) = 2(x-5)^2(x-2)x & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x = 4 and the moment t = 0.9 by means of a Fourier series of order 8 .

1) u(4 , 0.9) = 1.90428

2) u(4 , 0.9) = 3.33649

3) u(4 , 0.9) = 0.0601037

4) u(4 , 0.9) = 0.621875

5) u(4 , 0.9) = 2.94254

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EDP-01 for serial number: 28

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} \frac{3x}{2} & 0 \le x \le 2 \\ 5 - x & 2 \le x \le 3 \\ -\frac{2x}{\pi-3} + \frac{6}{\pi-3} + 2 & 3 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.5 by means of a Fourier series of order 12 .

1) u(2 , 0.5) = 3.79961

2) u(2 , 0.5) = 0.0265297

3) u(2 , 0.5) = -2.80178

4) u(2 , 0.5) = 8.69558

5) u(2 , 0.5) = -5.46176

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = 3(x-2)x^2(x-\pi)^2 & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = 2(x-2)x(x-\pi) & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 2
and the moment t= 0.8 by means of a Fourier series of order 8 .

1) u(2 , 0.8) = 6.39862

2) u(2 , 0.8) = 1.14768

3) u(2 , 0.8) = -1.5818

4) u(2 , 0.8) = -0.00974648

5) u(2 , 0.8) = -0.848161

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EDP-01 for serial number: 29

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t) = u(2,t) = 0 & 0 \le t \\ u(x,0) = (x-2)^2 (x-1) x^2 & 0 \le x \le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = \frac{2}{5}$ and the moment $t = 0.2$ by means of a Fourier series of order 9 .

1) $u\left(\frac{2}{5}, 0.2\right) = -0.0354289$

2) $u\left(\frac{2}{5}, 0.2\right) = 1.40118$

3) $u\left(\frac{2}{5}, 0.2\right) = 3.86831$

4) $u\left(\frac{2}{5}, 0.2\right) = -3.87381$

5) $u\left(\frac{2}{5}, 0.2\right) = 6.6136$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(1,t) = 0 & 0 \le t \\ u(x,0) = -(x-1)^2 \left(x-\frac{4}{5}\right) x^2 & 0 \le x \le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = \frac{9}{10}$ and the moment $t = 0.4$ by means of a Fourier series of order 10 .

1) $u\left(\frac{9}{10}, 0.4\right) = 0.01$

2) $u\left(\frac{9}{10}, 0.4\right) = -2.16561$

3) $u\left(\frac{9}{10}, 0.4\right) = -3.82448$

4) $u\left(\frac{9}{10}, 0.4\right) = -2.01629$

5) $u\left(\frac{9}{10}, 0.4\right) = 2.43577$

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EDP-01 for serial number: 30

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=-\left((x-3)\,x^2\,(x-\pi)^2\right) & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$ and the moment $t=0.2$ by means of a Fourier series of order 12.

1) u(1, 0.2) = 5.2139

2) u(1, 0.2) = 2.79533

3) u(1, 0.2) = −1.91681

4) u(1, 0.2) = 1.0802

5) u(1, 0.2) = 3.85579

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(3,t)=0 & 0\le t \\ u(x,0)=-2\,(x-3)\,(x-2)\,x^2 & 0\le x\le 3 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$ and the moment $t=0.5$ by means of a Fourier series of order 11.

1) u(1, 0.5) = −1.03192

2) u(1, 0.5) = −2.36706

3) u(1, 0.5) = 2.09834

4) u(1, 0.5) = −3.69404

5) u(1, 0.5) = −4.25552

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EDP-01 for serial number: 31

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 2x & 0 \le x \le 1 \\ 8-6x & 1 \le x \le 2 \\ \frac{4x}{\pi-2} - \frac{8}{\pi-2} - 4 & 2 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 2$ and the moment $t = 0.2$ by means of a Fourier series of order 12.

1) $u(2, 0.2) = -8.69998$

2) $u(2, 0.2) = -1.7252$

3) $u(2, 0.2) = 0.404481$

4) $u(2, 0.2) = -3.81686$

5) $u(2, 0.2) = -6.16587$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(4,t) = 0 & 0 \le t \\ u(x,0) = (x-4)^2 (x-1)\, x & 0 \le x \le 4 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 3$ and the moment $t = 0.1$ by means of a Fourier series of order 9.

1) $u(3, 0.1) = 2.16091$

2) $u(3, 0.1) = 2.38604$

3) $u(3, 0.1) = -1.43399$

4) $u(3, 0.1) = 4.83692$

5) $u(3, 0.1) = -4.54174$

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EDP-01 for serial number: 32

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ u(0,t) = u(3,t) = 0 & 0 \le t \\ u(x,0) = (x-3)^2 (x-2)\, x & 0 \le x \le 3 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 2$ and the moment $t = 0.9$ by means of a Fourier series of order 8 .

1) $u(2, 0.9) = -6.98639$

2) $u(2, 0.9) = 2.76318$

3) $u(2, 0.9) = -2.9479 \times 10^{-7}$

4) $u(2, 0.9) = 6.08994$

5) $u(2, 0.9) = 6.95521$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(5,t) = 0 & 0 \le t \\ u(x,0) = -3\,(x-5)\,(x-4)\, x & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 4$ and the moment $t = 0.7$ by means of a Fourier series of order 11 .

1) $u(4, 0.7) = -0.988574$

2) $u(4, 0.7) = -0.874522$

3) $u(4, 0.7) = 3.25174$

4) $u(4, 0.7) = -14.3141$

5) $u(4, 0.7) = 2.80752$

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EDP-01 for serial number: 33

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ u(0,t) = u(3,t) = 0 & 0 \le t \\ u(x,0) = 3\ (x-3)\ (x-2)\ (x-1)\ x^2 & 0 \le x \le 3 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.6 by means of a Fourier series of order 11 .

1) u(2 , 0.6) = −7.17971

2) u(2 , 0.6) = 4.69937

3) u(2 , 0.6) = -3.72405×10^{-8}

4) u(2 , 0.6) = 4.73895

5) u(2 , 0.6) = 8.21245

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 4x & 0 \le x \le 2 \\ -\frac{8x}{\pi-2} + \frac{16}{\pi-2} + 8 & 2 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = \begin{cases} -3x & 0 \le x \le 1 \\ x-4 & 1 \le x \le 2 \\ \frac{2x}{\pi-2} - \frac{4}{\pi-2} - 2 & 2 \le x \le \pi \end{cases} & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 1
and the moment t= 0.9 by means of a Fourier series of order 9 .

1) u(1 , 0.9) = 8.63243

2) u(1 , 0.9) = −2.21161

3) u(1 , 0.9) = 0.512164

4) u(1 , 0.9) = 2.10583

5) u(1 , 0.9) = 8.55781

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EDP-01 for serial number: 34

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} x & 0\le x\le 3 \\ -\frac{3x}{\pi-3}+\frac{9}{\pi-3}+3 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.9 by means of a Fourier series of order 9 .

1) u(2 , 0.9) = 5.38375

2) u(2 , 0.9) = 6.34046

3) u(2 , 0.9) = 3.06661×10^{-10}

4) u(2 , 0.9) = -5.60892

5) u(2 , 0.9) = -6.77048

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=2(x-2)\,x\,(x-\pi)^2 & 0\le x\le \pi \\ \frac{\partial}{\partial t}u(x,0)=-3(x-2)(x-1)x^2(x-\pi)^2 & 0.\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 1
and the moment t= 0.6 by means of a Fourier series of order 11 .

1) u(1 , 0.6) = -7.51559

2) u(1 , 0.6) = 0.722458

3) u(1 , 0.6) = 4.82793

4) u(1 , 0.6) = -6.25807

5) u(1 , 0.6) = -3.71401

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EDP-01 for serial number: 35

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ u(0,t)=u(3,t)=0 & 0\le t \\ u(x,0)=-3\,(x-3)\,(x-2)\,(x-1)\,x & 0\le x\le 3 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.5 by means of a Fourier series of order 8 .

1) u(2 , 0.5) = −7.98498

2) u(2 , 0.5) = 0.0000535456

3) u(2 , 0.5) = 3.27083

4) u(2 , 0.5) = −0.776695

5) u(2 , 0.5) = 7.76625

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 5x & 0\le x\le 1 \\ 6-x & 1\le x\le 2 \\ -\frac{4x}{\pi-2}+\frac{8}{\pi-2}+4 & 2\le x\le \pi \end{cases} & 0\le x\le \pi \\ \frac{\partial}{\partial t}u(x,0)=-2\,(x-3)\,(x-1)\,x^2\,(x-\pi)^2 & 0.\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 2
and the moment t= 0.7 by means of a Fourier series of order 11 .

1) u(2 , 0.7) = −8.08935

2) u(2 , 0.7) = −1.01037

3) u(2 , 0.7) = −2.51976

4) u(2 , 0.7) = 3.172

5) u(2 , 0.7) = −4.02781

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EDP-01 for serial number: 36

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 2x & 0 \le x \le 1 \\ x+1 & 1 \le x \le 2 \\ -\frac{3x}{\pi-2} + \frac{6}{\pi-2} + 3 & 2 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=2$ and the moment $t=0.4$ by means of a Fourier series of order 10 .

1) $u(2, 0.4) = -4.90248$

2) $u(2, 0.4) = 0.785798$

3) $u(2, 0.4) = -4.46745$

4) $u(2, 0.4) = 0.00398231$

5) $u(2, 0.4) = -3.48701$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -8x & 0 \le x \le 1 \\ \frac{3x}{2} - \frac{19}{2} & 1 \le x \le 3 \\ \frac{5x}{\pi-3} - \frac{15}{\pi-3} - 5 & 3 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=2$ and the moment $t=0.8$ by means of a Fourier series of order 12 .

1) $u(2, 0.8) = -3.77284$

2) $u(2, 0.8) = -5.70851$

3) $u(2, 0.8) = 0.85123$

4) $u(2, 0.8) = -0.802205$

5) $u(2, 0.8) = 3.41539$

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EDP-01 for serial number: 37

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 2x & 0\le x\le 1 \lor 1\le x\le 3 \\ -\frac{6x}{\pi-3}+\frac{18}{\pi-3}+6 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2 and the moment t= 0.1 by means of a Fourier series of order 12 .

1) u(2 , 0.1) = -8.60129

2) u(2 , 0.1) = 3.92447

3) u(2 , 0.1) = 0.904035

4) u(2 , 0.1) = -6.03704

5) u(2 , 0.1) = -4.58863

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -\frac{2x}{3} & 0\le x\le 3 \\ \frac{2x}{\pi-3}-\frac{6}{\pi-3}-2 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2 and the moment t= 0.9 by means of a Fourier series of order 11 .

1) u(2 , 0.9) = 0.513171

2) u(2 , 0.9) = -1.

3) u(2 , 0.9) = 0.73694

4) u(2 , 0.9) = 0.361196

5) u(2 , 0.9) = -0.301549

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EDP-01 for serial number: 38

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = (x-2)(x-1)x^2(x-\pi)^2 & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.9 by means of a Fourier series of order 10 .

1) u(2 , 0.9) = 1.19307

2) u(2 , 0.9) = 0.0000283794

3) u(2 , 0.9) = -4.23212

4) u(2 , 0.9) = -6.58303

5) u(2 , 0.9) = 5.73553

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -3x & 0 \le x \le 3 \\ \frac{9x}{\pi-3} - \frac{27}{\pi-3} - 9 & 3 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.7 by means of a Fourier series of order 8 .

1) u(1 , 0.7) = -4.5

2) u(1 , 0.7) = -1.78784

3) u(1 , 0.7) = 1.92675

4) u(1 , 0.7) = 4.11141

5) u(1 , 0.7) = 1.12821

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EDP-01 for serial number: 39

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t)=u(4,t)=0 & 0\le t \\ u(x,0)=3\,(x-4)\,(x-2)\,x & 0\le x\le 4 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 3
and the moment t= 0.8 by means of a Fourier series of order 12 .

1) u (3 , 0.8) = -0.00345853

2) u (3 , 0.8) = 8.63728

3) u (3 , 0.8) = 2.5436

4) u (3 , 0.8) = -7.82753

5) u (3 , 0.8) = -6.23903

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(5,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -\frac{7x}{2} & 0\le x\le 2 \\ 7x-21 & 2\le x\le 4 \\ 35-7x & 4\le x\le 5 \end{cases} & 0\le x\le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 4
and the moment t= 0.8 by means of a Fourier series of order 11 .

1) u (4 , 0.8) = 3.21493

2) u (4 , 0.8) = -1.37784

3) u (4 , 0.8) = -3.67533

4) u (4 , 0.8) = -3.95628

5) u (4 , 0.8) = 1.99294

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EDP-01 for serial number: 40

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -\frac{9x}{2} & 0\le x\le 2 \\ 6x-21 & 2\le x\le 3 \\ \frac{3x}{\pi-3}-\frac{9}{\pi-3}-3 & 3\le x\le \pi \\ 0 & \text{True} \end{cases} & 0\le x\le \pi \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.5 by means of a Fourier series of order 11 .

1) u(1 , 0.5) = -4.69705

2) u(1 , 0.5) = -0.00210093

3) u(1 , 0.5) = -1.59609

4) u(1 , 0.5) = 4.06192

5) u(1 , 0.5) = -5.77034

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -x & 0\le x\le 1 \\ \frac{x}{\pi-1}-\frac{1}{\pi-1}-1 & 1\le x\le \pi \\ 0 & \text{True} \end{cases} & 0\le x\le \pi \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.5 by means of a Fourier series of order 8 .

1) u(2 , 0.5) = 3.44042

2) u(2 , 0.5) = -1.79908

3) u(2 , 0.5) = -3.14857

4) u(2 , 0.5) = -0.490767

5) u(2 , 0.5) = -2.22539

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EDP-01 for serial number: 41

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=(x-3)\,x^2\,(x-\pi)^2 & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$
and the moment $t=0.2$ by means of a Fourier series of order 9 .

1) u (1 , 0.2) = -6.42008

2) u (1 , 0.2) = -4.16346

3) u (1 , 0.2) = -1.0802

4) u (1 , 0.2) = -2.85676

5) u (1 , 0.2) = 3.88189

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=2\,(x-1)\,x\,(x-\pi) & 0\le x\le \pi \\ \frac{\partial}{\partial t}u(x,0)=-((x-3)\,(x-2)\,x\,(x-\pi)) & 0.\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x=1$
and the moment $t=0.1$ by means of a Fourier series of order 8 .

1) u (1 , 0.1) = -8.58118

2) u (1 , 0.1) = 8.51023

3) u (1 , 0.1) = 5.08149

4) u (1 , 0.1) = -3.67052

5) u (1 , 0.1) = -0.168593

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ u(0,t) = u(5,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -\frac{7x}{3} & 0 \le x \le 3 \\ 10x - 37 & 3 \le x \le 4 \\ 15 - 3x & 4 \le x \le 5 \end{cases} & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.4 by means of a Fourier series of order 9 .

1) u(2 , 0.4) = 7.74325

2) u(2 , 0.4) = -2.47338

3) u(2 , 0.4) = 2.99043

4) u(2 , 0.4) = -0.314931

5) u(2 , 0.4) = 0.402366

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t) = u(2,t) = 0 & 0 \le t \\ u(x,0) = 3(x-2)^2(x-1)x & 0 \le x \le 2 \\ \frac{\partial}{\partial t}u(x,0) = 2(x-2)(x-1)x & 0. \le x \le 2 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= $\frac{1}{2}$
and the moment t= 1. by means of a Fourier series of order 9 .

1) u($\frac{1}{2}$, 1.) = -8.23831

2) u($\frac{1}{2}$, 1.) = -2.27164

3) u($\frac{1}{2}$, 1.) = 0.316559

4) u($\frac{1}{2}$, 1.) = 1.11805

5) u($\frac{1}{2}$, 1.) = -3.18075

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 43

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t)=u(2,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -2x & 0\le x\le 1 \\ 2x-4 & 1\le x\le 2 \end{cases} & 0\le x\le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=\frac{3}{5}$

and the moment $t=0.8$ by means of a Fourier series of order 11 .

1) $u(\frac{3}{5}, 0.8) = -2.42516$

2) $u(\frac{3}{5}, 0.8) = 4.94417$

3) $u(\frac{3}{5}, 0.8) = 0$

4) $u(\frac{3}{5}, 0.8) = 2.51194$

5) $u(\frac{3}{5}, 0.8) = -7.79399$

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 9x & 0\le x\le 1 \\ \frac{29}{2}-\frac{11x}{2} & 1\le x\le 3 \\ \frac{2x}{\pi-3}-\frac{6}{\pi-3}-2 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ \frac{\partial}{\partial t}u(x,0)=\begin{cases} 8x & 0\le x\le 1 \\ -\frac{8x}{\pi-1}+\frac{8}{\pi-1}+8 & 1\le x\le \pi \end{cases} & 0.\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x=2$

and the moment $t=0.1$ by means of a Fourier series of order 10 .

1) $u(2, 0.1) = 0.52199$

2) $u(2, 0.1) = -6.99105$

3) $u(2, 0.1) = 3.89733$

4) $u(2, 0.1) = -3.95571$

5) $u(2, 0.1) = -8.00811$

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EDP-01 for serial number: 44

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 3x & 0 \le x \le 2 \\ 16 - 5x & 2 \le x \le 3 \\ -\frac{x}{\pi-3} + \frac{3}{\pi-3} + 1 & 3 \le x \le \pi \\ 0 & \text{True} \end{cases} & 0 \le x \le \pi \end{cases}$$

Compute the temperature of the bar at the point $x = 1$
and the moment $t = 0.7$ by means of a Fourier series of order 10 .

1) $u(1, 0.7) = 7.87936$

2) $u(1, 0.7) = 8.13818$

3) $u(1, 0.7) = 1.95417$

4) $u(1, 0.7) = -2.69203$

5) $u(1, 0.7) = 7.00648$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(1,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 45x & 0 \le x \le \frac{1}{5} \\ \frac{43}{3} - \frac{80x}{3} & \frac{1}{5} \le x \le \frac{1}{2} \\ 2 - 2x & \frac{1}{2} \le x \le 1 \\ 0 & \text{True} \end{cases} & 0 \le x \le 1 \end{cases}$$

Compute the temperature of the bar at the point $x = \frac{3}{10}$
and the moment $t = 0.7$ by means of a Fourier series of order 10 .

1) $u\left(\frac{3}{10}, 0.7\right) = -4.49502$

2) $u\left(\frac{3}{10}, 0.7\right) = -0.374754$

3) $u\left(\frac{3}{10}, 0.7\right) = -0.166826$

4) $u\left(\frac{3}{10}, 0.7\right) = 2.65$

5) $u\left(\frac{3}{10}, 0.7\right) = 1.18252$

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EDP-01 for serial number: 45

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=2\,(x-2)\,(x-1)\,x\,(x-\pi) & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$ and the moment $t=0.4$ by means of a Fourier series of order 12 .

1) $u(1,0.4) = -3.12051$

2) $u(1,0.4) = 0.763494$

3) $u(1,0.4) = 8.53863$

4) $u(1,0.4) = -0.0107749$

5) $u(1,0.4) = -3.87606$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(2,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -8x & 0\le x\le 1 \\ 8x-16 & 1\le x\le 2 \end{cases} & 0\le x\le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=\frac{9}{10}$ and the moment $t=0.9$ by means of a Fourier series of order 10 .

1) $u\left(\frac{9}{10},0.9\right) = 0.869488$

2) $u\left(\frac{9}{10},0.9\right) = 3.72622$

3) $u\left(\frac{9}{10},0.9\right) = 0.889709$

4) $u\left(\frac{9}{10},0.9\right) = -4.$

5) $u\left(\frac{9}{10},0.9\right) = -3.25008$

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EDP-01 for serial number: 46

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = -\left((x-3)\ (x-2)\ x^2\ (x-\pi)\right) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 1$ and the moment $t = 0.8$ by means of a Fourier series of order 8 .

1) $u(1, 0.8) = 0.0757015$

2) $u(1, 0.8) = -2.57685$

3) $u(1, 0.8) = 3.68338$

4) $u(1, 0.8) = -2.71338$

5) $u(1, 0.8) = -2.88226$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(1,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} \frac{20x}{3} & 0 \le x \le \frac{3}{5} \\ 10 - 10x & \frac{3}{5} \le x \le 1 \end{cases} & 0 \le x \le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = \frac{4}{5}$ and the moment $t = 0.4$ by means of a Fourier series of order 8 .

1) $u\left(\frac{4}{5}, 0.4\right) = 1.45991$

2) $u\left(\frac{4}{5}, 0.4\right) = -4.1035$

3) $u\left(\frac{4}{5}, 0.4\right) = -0.870065$

4) $u\left(\frac{4}{5}, 0.4\right) = 2.$

5) $u\left(\frac{4}{5}, 0.4\right) = 0.449094$

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 47

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ u(0,t) = u(5,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -x & 0 \le x \le 3 \\ 12x - 39 & 3 \le x \le 4 \\ 45 - 9x & 4 \le x \le 5 \end{cases} & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.8 by means of a Fourier series of order 8 .

1) u (1 , 0.8) = -4.79162

2) u (1 , 0.8) = -3.59116

3) u (1 , 0.8) = -0.0223525

4) u (1 , 0.8) = 8.1424

5) u (1 , 0.8) = -4.20647

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -2x & 0 \le x \le 2 \\ \frac{4x}{\pi-2} - \frac{8}{\pi-2} - 4 & 2 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 1. by means of a Fourier series of order 9 .

1) u (1 , 1.) = -1.20434

2) u (1 , 1.) = 4.54249

3) u (1 , 1.) = -1.99997

4) u (1 , 1.) = -2.59451

5) u (1 , 1.) = 3.88692

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=-3\,(x-1)\,x\,(x-\pi)^2 & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.5 by means of a Fourier series of order 12 .

1) u(2 , 0.5) = −0.0431837

2) u(2 , 0.5) = −7.67777

3) u(2 , 0.5) = −1.07085

4) u(2 , 0.5) = 0.523571

5) u(2 , 0.5) = 3.43892

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=3\,(x-1)\,x\,(x-\pi) & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.1 by means of a Fourier series of order 9 .

1) u(1 , 0.1) = −1.18235

2) u(1 , 0.1) = −1.94191

3) u(1 , 0.1) = 0.426529

4) u(1 , 0.1) = −3.99964

5) u(1 , 0.1) = 2.86089

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EDP-01 for serial number: 49

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ u(0,t) = u(3,t) = 0 & 0 \le t \\ u(x,0) = 2\,(x-3)^2\,(x-1)\,x & 0 \le x \le 3 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 1. by means of a Fourier series of order 12 .

1) u(1 , 1.) = 8.12156

2) u(1 , 1.) = -5.77859

3) u(1 , 1.) = 1.7678

4) u(1 , 1.) = 0.022157

5) u(1 , 1.) = 6.50802

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(1,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -15\,x & 0 \le x \le \frac{1}{5} \\ -2\,x - \frac{13}{5} & \frac{1}{5} \le x \le \frac{7}{10} \\ \frac{40\,x}{3} - \frac{40}{3} & \frac{7}{10} \le x \le 1 \end{cases} & 0 \le x \le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= $\frac{9}{10}$
and the moment t= 0.3 by means of a Fourier series of order 8 .

1) u($\frac{9}{10}$, 0.3) = -3.53464

2) u($\frac{9}{10}$, 0.3) = -4.20875

3) u($\frac{9}{10}$, 0.3) = -2.65

4) u($\frac{9}{10}$, 0.3) = -4.3672

5) u($\frac{9}{10}$, 0.3) = 0.489876

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ u(0,t) = u(1,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 5x & 0 \le x \le \frac{2}{5} \\ 8 - 15x & \frac{2}{5} \le x \le \frac{3}{5} \\ \frac{5x}{2} - \frac{5}{2} & \frac{3}{5} \le x \le 1 \end{cases} & 0 \le x \le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = \frac{1}{2}$ and the moment $t = 1.$ by means of a Fourier series of order 9 .

1) $u(\frac{1}{2}, 1.) = 3.14028$

2) $u(\frac{1}{2}, 1.) = 0$

3) $u(\frac{1}{2}, 1.) = -1.04315$

4) $u(\frac{1}{2}, 1.) = -6.57169$

5) $u(\frac{1}{2}, 1.) = -1.46949$

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -\frac{9x}{2} & 0 \le x \le 2 \\ \frac{9x}{\pi-2} - \frac{18}{\pi-2} - 9 & 2 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = -3(x-2)(x-1)x^2(x-\pi) & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x = 2$ and the moment $t = 0.4$ by means of a Fourier series of order 10 .

1) $u(2, 0.4) = -6.15006$

2) $u(2, 0.4) = -0.976704$

3) $u(2, 0.4) = -1.67132$

4) $u(2, 0.4) = -3.78573$

5) $u(2, 0.4) = -1.16547$

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ u(0,t)=u(3,t)=0 & 0\le t \\ u(x,0)=-3\,(x-3)\,(x-2)\,(x-1)\,x & 0\le x\le 3 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.7 by means of a Fourier series of order 9 .

1) u(2 , 0.7) = -8.53381

2) u(2 , 0.7) = 3.72816

3) u(2 , 0.7) = 1.20171

4) u(2 , 0.7) = -2.83121

5) u(2 , 0.7) = 0.000345431

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=-\left((x-3)\,(x-2)\,x\,(x-\pi)^2\right) & 0\le x\le \pi \\ \frac{\partial}{\partial t}u(x,0)=(x-3)\,(x-2)\,x^2\,(x-\pi)^2 & 0.\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 2
and the moment t= 0.1 by means of a Fourier series of order 12 .

1) u(2 , 0.1) = -6.61544

2) u(2 , 0.1) = -0.246878

3) u(2 , 0.1) = -2.66146

4) u(2 , 0.1) = 4.53216

5) u(2 , 0.1) = 5.48524

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EDP-01 for serial number: 52

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = -((x-3)(x-2)\,x\,(x-\pi)) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.8 by means of a Fourier series of order 12 .

1) u(2 , 0.8) = -4.99606

2) u(2 , 0.8) = -7.17203

3) u(2 , 0.8) = 0.902623

4) u(2 , 0.8) = 1.64076

5) u(2 , 0.8) = -0.498036

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -\frac{3x}{2} & 0 \le x \le 2 \\ 3-3x & 2 \le x \le 3 \\ \frac{6x}{\pi-3} - \frac{18}{\pi-3} - 6 & 3 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.1 by means of a Fourier series of order 9 .

1) u(2 , 0.1) = 1.17119

2) u(2 , 0.1) = 4.28943

3) u(2 , 0.1) = 1.22894

4) u(2 , 0.1) = -2.59694

5) u(2 , 0.1) = 0.434243

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EDP-01 for serial number: 53

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=-3\,(x-3)\,x\,(x-\pi) & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=2$
and the moment $t=0.1$ by means of a Fourier series of order 8 .

1) u(2 , 0.1) = -1.99877

2) u(2 , 0.1) = 1.01185

3) u(2 , 0.1) = 3.04341

4) u(2 , 0.1) = 3.58106

5) u(2 , 0.1) = -7.65367

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -x & 0\le x\le 1 \\ 3-4x & 1\le x\le 3 \\ \frac{9x}{\pi-3}-\frac{27}{\pi-3}-9 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ \frac{\partial}{\partial t}u(x,0)=2\,(x-1)\,x\,(x-\pi) & 0.\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x=2$
and the moment $t=1.$ by means of a Fourier series of order 9 .

1) u(2 , 1.) = 6.06678

2) u(2 , 1.) = 2.95967

3) u(2 , 1.) = -6.36303

4) u(2 , 1.) = -8.37912

5) u(2 , 1.) = 4.97899

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EDP-01 for serial number: 54

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -6x & 0 \le x \le 1 \\ -\frac{3x}{2} - \frac{9}{2} & 1 \le x \le 3 \\ \frac{9x}{\pi-3} - \frac{27}{\pi-3} - 9 & 3 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.8 by means of a Fourier series of order 8 .

1) u(1 , 0.8) = -0.0000191792

2) u(1 , 0.8) = -6.11255

3) u(1 , 0.8) = 1.76734

4) u(1 , 0.8) = -6.42418

5) u(1 , 0.8) = 2.48023

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(5,t) = 0 & 0 \le t \\ u(x,0) = (x-5)(x-2)(x-1)x^2 & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 4
and the moment t= 0.3 by means of a Fourier series of order 10 .

1) u(4 , 0.3) = 3.17182

2) u(4 , 0.3) = -4.8595

3) u(4 , 0.3) = -3.19897

4) u(4 , 0.3) = -54.6062

5) u(4 , 0.3) = -0.412566

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EDP-01 for serial number: 55

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ u(0,t)=u(1,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -50x & 0\le x\le \frac{1}{10} \\ \frac{80x}{7}-\frac{43}{7} & \frac{1}{10}\le x\le \frac{4}{5} \\ 15-15x & \frac{4}{5}\le x\le 1 \end{cases} & 0\le x\le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=\frac{1}{2}$ and the moment $t=0.9$ by means of a Fourier series of order 10.

1) $u(\frac{1}{2}, 0.9) = -2.52388$

2) $u(\frac{1}{2}, 0.9) = 8.74082$

3) $u(\frac{1}{2}, 0.9) = -7.49603$

4) $u(\frac{1}{2}, 0.9) = -4.68405$

5) $u(\frac{1}{2}, 0.9) = 0$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=3(x-3)x^2(x-\pi)^2 & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$ and the moment $t=1.$ by means of a Fourier series of order 10.

1) $u(1, 1.) = -13.9217$

2) $u(1, 1.) = -1.36216$

3) $u(1, 1.) = 2.53052$

4) $u(1, 1.) = -0.338906$

5) $u(1, 1.) = 2.04126$

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 56

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = -2\,(x-2)\,(x-1)\,x\,(x-\pi)^2 & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.4 by means of a Fourier series of order 11 .

1) u(2 , 0.4) = 6.49287

2) u(2 , 0.4) = 2.35034

3) u(2 , 0.4) = 7.39726

4) u(2 , 0.4) = -0.0122513

5) u(2 , 0.4) = -4.0516

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -x & 0 \le x \le 1 \\ 6x-7 & 1 \le x \le 2 \\ -\frac{5x}{\pi-2} + \frac{10}{\pi-2} + 5 & 2 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.8 by means of a Fourier series of order 9 .

1) u(1 , 0.8) = 2.39092

2) u(1 , 0.8) = 1.38591

3) u(1 , 0.8) = -2.50913

4) u(1 , 0.8) = -2.24078

5) u(1 , 0.8) = -0.227812

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 57

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ u(0,t) = u(5,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} \frac{9x}{2} & 0 \le x \le 2 \\ 25 - 8x & 2 \le x \le 3 \\ \frac{5}{2} - \frac{x}{2} & 3 \le x \le 5 \end{cases} & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.5 by means of a Fourier series of order 9 .

1) u (1 , 0.5) = -0.0425985

2) u (1 , 0.5) = 7.75696

3) u (1 , 0.5) = 1.40595

4) u (1 , 0.5) = 7.51006

5) u (1 , 0.5) = -0.708462

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = (x-3)(x-1)x(x-\pi)^2 & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = 3(x-2)(x-1)x^2(x-\pi) & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 2
and the moment t= 0.4 by means of a Fourier series of order 11 .

1) u (2 , 0.4) = 1.58969

2) u (2 , 0.4) = 3.08413

3) u (2 , 0.4) = 2.95909

4) u (2 , 0.4) = -3.44099

5) u (2 , 0.4) = -2.47032

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 58

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = 3\,(x-3)\,x^2\,(x-\pi)^2 & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=2$ and the moment $t=0.5$ by means of a Fourier series of order 9 .

1) u (2 , 0.5) = 8.6125

2) u (2 , 0.5) = −12.0506

3) u (2 , 0.5) = −5.97823

4) u (2 , 0.5) = −3.21786

5) u (2 , 0.5) = 8.94394

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(5,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} x & 0 \le x \le 2 \\ 2x-2 & 2 \le x \le 4 \\ 30-6x & 4 \le x \le 5 \end{cases} & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=2$ and the moment $t=0.2$ by means of a Fourier series of order 9 .

1) u (2 , 0.2) = −1.90858

2) u (2 , 0.2) = −3.30943

3) u (2 , 0.2) = −1.46217

4) u (2 , 0.2) = 2.36914

5) u (2 , 0.2) = −4.9711

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EDP-01 for serial number: 59

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ u(0,t)=u(1,t)=0 & 0\le t \\ u(x,0)=(x-1)\left(x-\frac{3}{10}\right)x & 0\le x\le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=\frac{3}{10}$ and the moment $t=0.8$ by means of a Fourier series of order 8.

1) $u\left(\frac{3}{10}, 0.8\right) = 3.89953$

2) $u\left(\frac{3}{10}, 0.8\right) = -2.17683$

3) $u\left(\frac{3}{10}, 0.8\right) = 0$

4) $u\left(\frac{3}{10}, 0.8\right) = 6.50652$

5) $u\left(\frac{3}{10}, 0.8\right) = -1.61036$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=-2(x-3)x^2(x-\pi)^2 & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=2$ and the moment $t=0.2$ by means of a Fourier series of order 12.

1) $u(2, 0.2) = 4.16656$

2) $u(2, 0.2) = -4.02223$

3) $u(2, 0.2) = -0.0959473$

4) $u(2, 0.2) = 9.21359$

5) $u(2, 0.2) = 3.43348$

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EDP-01 for serial number: 60

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t) = u(2,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 7x & 0 \le x \le 1 \\ 14 - 7x & 1 \le x \le 2 \end{cases} & 0 \le x \le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = \frac{3}{5}$ and the moment $t = 0.8$ by means of a Fourier series of order 8.

1) $u(\frac{3}{5}, 0.8) = -6.90286$

2) $u(\frac{3}{5}, 0.8) = 0.637651$

3) $u(\frac{3}{5}, 0.8) = -8.41964$

4) $u(\frac{3}{5}, 0.8) = 6.78643$

5) $u(\frac{3}{5}, 0.8) = 3.46507$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(5,t) = 0 & 0 \le t \\ u(x,0) = -(x-5)^2 (x-2) x^2 & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 1$ and the moment $t = 0.9$ by means of a Fourier series of order 8.

1) $u(1, 0.9) = -6.43296$

2) $u(1, 0.9) = 0.196649$

3) $u(1, 0.9) = -2.91887$

4) $u(1, 0.9) = -2.5097$

5) $u(1, 0.9) = -3.80573$

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 61

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -3x & 0 \le x \le 2 \\ 5x - 16 & 2 \le x \le 3 \\ \frac{x}{\pi-3} - \frac{3}{\pi-3} - 1 & 3 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 2$ and the moment $t = 0.7$ by means of a Fourier series of order 11 .

1) $u(2, 0.7) = 3.57059$

2) $u(2, 0.7) = 8.86103$

3) $u(2, 0.7) = 3.18862$

4) $u(2, 0.7) = 4.24979$

5) $u(2, 0.7) = -1.09968 \times 10^{-7}$

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = 3(x-2)(x-1)x^2(x-\pi) & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = \begin{cases} \frac{3x}{2} & 0 \le x \le 2 \\ 25 - 11x & 2 \le x \le 3 \\ \frac{8x}{\pi-3} - \frac{24}{\pi-3} - 8 & 3 \le x \le \pi \end{cases} & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x = 1$ and the moment $t = 0.8$ by means of a Fourier series of order 11 .

1) $u(1, 0.8) = -1.83393$

2) $u(1, 0.8) = -3.89148$

3) $u(1, 0.8) = 6.30202$

4) $u(1, 0.8) = 8.99529$

5) $u(1, 0.8) = 1.92669$

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 62

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -8x & 0 \le x \le 1 \\ \frac{x}{2} - \frac{17}{2} & 1 \le x \le 3 \\ \frac{7x}{\pi-3} - \frac{21}{\pi-3} - 7 & 3 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 1$ and the moment $t = 0.2$ by means of a Fourier series of order 12 .

1) $u(1, 0.2) = -0.0507444$

2) $u(1, 0.2) = -3.36009$

3) $u(1, 0.2) = 3.2086$

4) $u(1, 0.2) = 1.7687$

5) $u(1, 0.2) = 8.73948$

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = 2(x-1)x^2(x-\pi)^2 & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = \begin{cases} -\frac{7x}{3} & 0 \le x \le 3 \\ \frac{7x}{\pi-3} - \frac{21}{\pi-3} - 7 & 3 \le x \le \pi \end{cases} & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x = 1$ and the moment $t = 1.$ by means of a Fourier series of order 11 .

1) $u(1, 1.) = 5.69043$

2) $u(1, 1.) = -10.3719$

3) $u(1, 1.) = 6.81015$

4) $u(1, 1.) = -7.04813$

5) $u(1, 1.) = -3.28024$

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 63

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} \frac{4x}{3} & 0\le x\le 3 \\ -\frac{4x}{\pi-3}+\frac{12}{\pi-3}+4 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.1 by means of a Fourier series of order 9 .

1) u(1 , 0.1) = 7.64682

2) u(1 , 0.1) = -6.86544

3) u(1 , 0.1) = 3.43608

4) u(1 , 0.1) = 0.183523

5) u(1 , 0.1) = -7.57748

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ u(0,t)=u(1,t)=0 & 0\le t \\ u(x,0)=2(x-1)\left(x-\frac{2}{5}\right)x^2 & 0\le x\le 1 \\ \frac{\partial}{\partial t}u(x,0)=\begin{cases} -20x & 0\le x\le \frac{2}{5} \\ -5x-6 & \frac{2}{5}\le x\le \frac{3}{5} \\ \frac{45x}{2}-\frac{45}{2} & \frac{3}{5}\le x\le 1 \end{cases} & 0.\le x\le 1 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= $\frac{3}{5}$
and the moment t= 0.7 by means of a Fourier series of order 9 .

1) u($\frac{3}{5}$, 0.7) = 6.67817

2) u($\frac{3}{5}$, 0.7) = -3.23076

3) u($\frac{3}{5}$, 0.7) = 3.86326

4) u($\frac{3}{5}$, 0.7) = 1.21259

5) u($\frac{3}{5}$, 0.7) = -1.63782

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 64

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t)=u(2,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -x & 0\le x\le 1 \\ x-2 & 1\le x\le 2 \end{cases} & 0\le x\le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=\frac{8}{5}$

and the moment $t=0.8$ by means of a Fourier series of order 8 .

1) $u(\frac{8}{5}, 0.8) = -1.04073$

2) $u(\frac{8}{5}, 0.8) = -6.89141$

3) $u(\frac{8}{5}, 0.8) = 8.42786$

4) $u(\frac{8}{5}, 0.8) = 0.896257$

5) $u(\frac{8}{5}, 0.8) = 0$

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ u(0,t)=u(5,t)=0 & 0\le t \\ u(x,0)=2(x-5)^2(x-4)(x-2)x^2 & 0\le x\le 5 \\ \frac{\partial}{\partial t}u(x,0)=\begin{cases} \frac{x}{4} & 0\le x\le 4 \\ 5-x & 4\le x\le 5 \end{cases} & 0.\le x\le 5 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x=3$

and the moment $t=0.1$ by means of a Fourier series of order 8 .

1) $u(3, 0.1) = 2.8741$

2) $u(3, 0.1) = -48.8205$

3) $u(3, 0.1) = 1.16098$

4) $u(3, 0.1) = 3.08688$

5) $u(3, 0.1) = 0.775257$

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EDP-01 for serial number: 65

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=2\,(x-3)\,(x-1)\,x\,(x-\pi)^2 & 0\le x\le\pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.8 by means of a Fourier series of order 11 .

1) u(1 , 0.8) = -0.747062

2) u(1 , 0.8) = -0.00148067

3) u(1 , 0.8) = -7.38947

4) u(1 , 0.8) = 6.69706

5) u(1 , 0.8) = -4.03281

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} \frac{x}{2} & 0\le x\le 2 \\ -\frac{x}{\pi-2}+\frac{2}{\pi-2}+1 & 2\le x\le\pi \end{cases} & 0\le x\le\pi \\ \frac{\partial}{\partial t}u(x,0)=\begin{cases} -4x & 0\le x\le 2 \\ \frac{8x}{\pi-2}-\frac{16}{\pi-2}-8 & 2\le x\le\pi \end{cases} & 0.\le x\le\pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 1
and the moment t= 1. by means of a Fourier series of order 9 .

1) u(1 , 1.) = 8.71295

2) u(1 , 1.) = -0.229174

3) u(1 , 1.) = 6.68468

4) u(1 , 1.) = -3.52214

5) u(1 , 1.) = 4.49927

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EDP-01 for serial number: 66

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t)=u(2,t)=0 & 0\le t \\ u(x,0)=\begin{cases} x & 0\le x\le 1 \\ 2-x & 1\le x\le 2 \end{cases} & 0\le x\le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=\frac{8}{5}$

and the moment $t=0.5$ by means of a Fourier series of order 9 .

1) $u\left(\frac{8}{5},0.5\right) = 1.93447$

2) $u\left(\frac{8}{5},0.5\right) = 5.16904$

3) $u\left(\frac{8}{5},0.5\right) = 7.17637\times 10^{-6}$

4) $u\left(\frac{8}{5},0.5\right) = 7.68318$

5) $u\left(\frac{8}{5},0.5\right) = -3.97872$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -x & 0\le x\le 2 \\ 8-5x & 2\le x\le 3 \\ \frac{7x}{\pi-3}-\frac{21}{\pi-3}-7 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=2$

and the moment $t=1.$ by means of a Fourier series of order 9 .

1) $u(2,1.) = 0.920717$

2) $u(2,1.) = -4.95915$

3) $u(2,1.) = -4.33248$

4) $u(2,1.) = -2.58769$

5) $u(2,1.) = 0.954128$

Further Mathematics - Degree in Engineering - 2024/2025
EDP-01 for serial number: 67

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 7x & 0\le x\le 1 \\ 14-7x & 1\le x\le 3 \\ \frac{7x}{\pi-3}-\frac{21}{\pi-3}-7 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$ and the moment $t=0.1$ by means of a Fourier series of order 9.

1) $u(1,0.1) = -5.87844$

2) $u(1,0.1) = -1.65636$

3) $u(1,0.1) = -3.43123$

4) $u(1,0.1) = 4.50226$

5) $u(1,0.1) = -3.71815$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=2(x-1)x(x-\pi) & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$ and the moment $t=0.7$ by means of a Fourier series of order 10.

1) $u(1,0.7) = 0.22016$

2) $u(1,0.7) = 0.516567$

3) $u(1,0.7) = -2.64668$

4) $u(1,0.7) = -3.20267$

5) $u(1,0.7) = -1.17676$

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EDP-01 for serial number: 68

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ u(0,t) = u(3,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 8x & 0 \le x \le 1 \\ 12-4x & 1 \le x \le 3 \end{cases} & 0 \le x \le 3 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.6 by means of a Fourier series of order 11 .

1) u(2 , 0.6) = −8.21442

2) u(2 , 0.6) = 0.393583

3) u(2 , 0.6) = 6.69195

4) u(2 , 0.6) = −5.32633

5) u(2 , 0.6) = 6.87134

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(1,t) = 0 & 0 \le t \\ u(x,0) = -2(x-1)^2\left(x-\frac{2}{5}\right)\left(x-\frac{1}{10}\right)x^2 & 0 \le x \le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= $\frac{3}{10}$
and the moment t= 0.1 by means of a Fourier series of order 10 .

1) u($\frac{3}{10}$, 0.1) = 3.79966

2) u($\frac{3}{10}$, 0.1) = 2.1482

3) u($\frac{3}{10}$, 0.1) = 2.90479

4) u($\frac{3}{10}$, 0.1) = −0.00504762

5) u($\frac{3}{10}$, 0.1) = 2.3119

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 4x & 0\le x\le 1 \\ 11-7x & 1\le x\le 2 \\ \frac{3x}{\pi-2}-\frac{6}{\pi-2}-3 & 2\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.8 by means of a Fourier series of order 11 .

1) u (1 , 0.8) = 7.4176×10^{-7}

2) u (1 , 0.8) = -7.00553

3) u (1 , 0.8) = -4.09945

4) u (1 , 0.8) = -5.37623

5) u (1 , 0.8) = -0.938668

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} \frac{5x}{3} & 0\le x\le 3 \\ -\frac{5x}{\pi-3}+\frac{15}{\pi-3}+5 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.4 by means of a Fourier series of order 11 .

1) u (1 , 0.4) = -1.05421

2) u (1 , 0.4) = 2.49831

3) u (1 , 0.4) = -1.484

4) u (1 , 0.4) = -1.82627

5) u (1 , 0.4) = -4.56858

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EDP-01 for serial number: 70

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=-3\,(x-2)\,x^2\,(x-\pi) & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.7 by means of a Fourier series of order 10 .

1) u(2 , 0.7) = -0.928226

2) u(2 , 0.7) = -2.28255

3) u(2 , 0.7) = -8.99664

4) u(2 , 0.7) = 3.37929

5) u(2 , 0.7) = 5.72354

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(5,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 9x & 0\le x\le 1 \\ \frac{32}{3}-\frac{5x}{3} & 1\le x\le 4 \\ 20-4x & 4\le x\le 5 \end{cases} & 0\le x\le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 3
and the moment t= 0.5 by means of a Fourier series of order 10 .

1) u(3 , 0.5) = 4.15268

2) u(3 , 0.5) = -4.96519

3) u(3 , 0.5) = 2.40816

4) u(3 , 0.5) = 5.17683

5) u(3 , 0.5) = -1.32957

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EDP-01 for serial number: 71

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = (x-2)(x-1)x^2(x-\pi) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.4 by means of a Fourier series of order 11 .

1) u(2 , 0.4) = 2.79061

2) u(2 , 0.4) = -7.61248

3) u(2 , 0.4) = -0.0912649

4) u(2 , 0.4) = -3.99676

5) u(2 , 0.4) = 7.20145

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 3x & 0 \le x \le 1 \\ 9-6x & 1 \le x \le 3 \\ \frac{9x}{\pi-3} - \frac{27}{\pi-3} - 9 & 3 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = \begin{cases} -6x & 0 \le x \le 1 \\ \frac{6x}{\pi-1} - \frac{6}{\pi-1} - 6 & 1 \le x \le \pi \end{cases} & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 1
and the moment t= 0.1 by means of a Fourier series of order 8 .

1) u(1 , 0.1) = -8.87871

2) u(1 , 0.1) = 0.965097

3) u(1 , 0.1) = 0.0609169

4) u(1 , 0.1) = 6.09684

5) u(1 , 0.1) = -6.83887

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EDP-01 for serial number: 72

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t)=u(2,t)=0 & 0\le t \\ u(x,0)=2\,(x-2)\,(x-1)\,x & 0\le x\le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=\frac{6}{5}$ and the moment $t=0.5$ by means of a Fourier series of order 12 .

1) $u\left(\frac{6}{5}, 0.5\right) = 2.66632$

2) $u\left(\frac{6}{5}, 0.5\right) = 0$

3) $u\left(\frac{6}{5}, 0.5\right) = -7.64745$

4) $u\left(\frac{6}{5}, 0.5\right) = 2.22037$

5) $u\left(\frac{6}{5}, 0.5\right) = -1.31904$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -\frac{3x}{2} & 0\le x\le 2 \\ \frac{3x}{\pi-2}-\frac{6}{\pi-2}-3 & 2\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=2$ and the moment $t=0.5$ by means of a Fourier series of order 10 .

1) $u(2, 0.5) = -0.50481$

2) $u(2, 0.5) = 0.612166$

3) $u(2, 0.5) = -1.5$

4) $u(2, 0.5) = 4.38158$

5) $u(2, 0.5) = -4.02862$

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EDP-01 for serial number: 73

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = -\left((x-3)(x-1)x^2(x-\pi)^2\right) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.1 by means of a Fourier series of order 8 .

1) u(2 , 0.1) = 0.552374

2) u(2 , 0.1) = -2.14447

3) u(2 , 0.1) = -7.94032

4) u(2 , 0.1) = -0.443218

5) u(2 , 0.1) = -4.01407

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(5,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} \frac{x}{2} & 0 \le x \le 2 \\ \frac{5}{3} - \frac{x}{3} & 2 \le x \le 5 \end{cases} & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.9 by means of a Fourier series of order 10 .

1) u(2 , 0.9) = -0.0673694

2) u(2 , 0.9) = -1.20928

3) u(2 , 0.9) = 4.72864

4) u(2 , 0.9) = -4.36103

5) u(2 , 0.9) = 0.597614

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EDP-01 for serial number: 74

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t)=u(2,t)=0 & 0\le t \\ u(x,0)=3\ (x-2)\ (x-1)\ x^2 & 0\le x\le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.9 by means of a Fourier series of order 8 .

1) u(1 , 0.9) = 0

2) u(1 , 0.9) = -8.81962

3) u(1 , 0.9) = -6.78561

4) u(1 , 0.9) = 6.49009

5) u(1 , 0.9) = -3.61494

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=3\ (x-1)\ x^2\ (x-\pi) & 0\le x\le \pi \\ \frac{\partial}{\partial t}u(x,0)=3\ (x-3)\ x^2\ (x-\pi)^2 & 0.\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 1
and the moment t= 1. by means of a Fourier series of order 9 .

1) u(1 , 1.) = 2.29969

2) u(1 , 1.) = -4.73245

3) u(1 , 1.) = -0.964586

4) u(1 , 1.) = -11.3171

5) u(1 , 1.) = -7.84525

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EDP-01 for serial number: 75

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t)=u(2,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 2x & 0\le x\le 1 \\ 4-2x & 1\le x\le 2 \end{cases} & 0\le x\le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=\frac{6}{5}$ and the moment $t=0.8$ by means of a Fourier series of order 8 .

1) $u(\frac{6}{5},0.8) = 0$

2) $u(\frac{6}{5},0.8) = 5.50791$

3) $u(\frac{6}{5},0.8) = -8.16421$

4) $u(\frac{6}{5},0.8) = 7.99527$

5) $u(\frac{6}{5},0.8) = 6.7965$

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -\frac{5x}{3} & 0\le x\le 3 \\ \frac{5x}{\pi-3}-\frac{15}{\pi-3}-5 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ \frac{\partial}{\partial t}u(x,0)=\begin{cases} 7x & 0\le x\le 1 \\ 14-7x & 1\le x\le 3 \\ \frac{7x}{\pi-3}-\frac{21}{\pi-3}-7 & 3\le x\le \pi \end{cases} & 0.\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x=2$ and the moment $t=0.2$ by means of a Fourier series of order 11 .

1) $u(2,0.2) = 1.05968$

2) $u(2,0.2) = -3.61979$

3) $u(2,0.2) = -1.11561$

4) $u(2,0.2) = -1.65935$

5) $u(2,0.2) = -5.71678$

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EDP-01 for serial number: 76

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t)=u(4,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -\frac{x}{3} & 0\le x\le 3 \\ x-4 & 3\le x\le 4 \end{cases} & 0\le x\le 4 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$ and the moment $t=0.7$ by means of a Fourier series of order 11 .

1) u (1 , 0.7) = -4.15856

2) u (1 , 0.7) = -7.55528

3) u (1 , 0.7) = -8.59342

4) u (1 , 0.7) = -0.0958014

5) u (1 , 0.7) = -2.60101

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=-3\,(x-3)\,x^2\,(x-\pi)^2 & 0\le x\le \pi \\ \frac{\partial}{\partial t}u(x,0)=\begin{cases} \frac{9x}{2} & 0\le x\le 2 \\ -\frac{9x}{\pi-2}+\frac{18}{\pi-2}+9 & 2\le x\le \pi \end{cases} & 0.\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x=1$ and the moment $t=0.7$ by means of a Fourier series of order 8 .

1) u (1 , 0.7) = 8.96441

2) u (1 , 0.7) = 7.16669

3) u (1 , 0.7) = 17.7389

4) u (1 , 0.7) = -8.33958

5) u (1 , 0.7) = 4.20125

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EDP-01 for serial number: 77

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = 3\,(x-3)\,(x-2)\,x^2\,(x-\pi)^2 & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 1$
and the moment $t = 0.6$ by means of a Fourier series of order 10 .

1) u (1 , 0.6) = -8.14445

2) u (1 , 0.6) = 5.8184

3) u (1 , 0.6) = 1.09089

4) u (1 , 0.6) = -5.46285

5) u (1 , 0.6) = -3.85323

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = -2\,(x-3)\,(x-1)\,x\,(x-\pi) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 2$
and the moment $t = 0.9$ by means of a Fourier series of order 8 .

1) u (2 , 0.9) = 4.30733

2) u (2 , 0.9) = -1.50276

3) u (2 , 0.9) = 3.02814

4) u (2 , 0.9) = -0.160334

5) u (2 , 0.9) = 1.91731

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EDP-01 for serial number: 78

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ u(0,t) = u(5,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -4x & 0 \le x \le 1 \\ x-5 & 1 \le x \le 5 \end{cases} & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 4
and the moment t= 0.2 by means of a Fourier series of order 10 .

1) u(4 , 0.2) = -0.999999

2) u(4 , 0.2) = 0.56457

3) u(4 , 0.2) = 7.73911

4) u(4 , 0.2) = -4.76894

5) u(4 , 0.2) = 6.23353

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ u(0,t) = u(3,t) = 0 & 0 \le t \\ u(x,0) = -((x-3)(x-2)(x-1)x) & 0 \le x \le 3 \\ \frac{\partial}{\partial t}u(x,0) = \begin{cases} 2x & 0 \le x \le 2 \\ 12-4x & 2 \le x \le 3 \end{cases} & 0. \le x \le 3 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 1
and the moment t= 1. by means of a Fourier series of order 10 .

1) u(1 , 1.) = -5.95655

2) u(1 , 1.) = -0.00851202

3) u(1 , 1.) = -4.62636

4) u(1 , 1.) = 7.61794

5) u(1 , 1.) = -2.92415

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EDP-01 for serial number: 79

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} \frac{4x}{3} & 0\le x\le 3 \\ -\frac{4x}{\pi-3}+\frac{12}{\pi-3}+4 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2 and the moment t= 0.3 by means of a Fourier series of order 12 .

1) u(2 , 0.3) = -4.00601

2) u(2 , 0.3) = 3.23886

3) u(2 , 0.3) = 8.72401

4) u(2 , 0.3) = 0.162436

5) u(2 , 0.3) = -3.6447

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(4,t)=0 & 0\le t \\ u(x,0)=-2(x-4)(x-3)(x-1)x^2 & 0\le x\le 4 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 3 and the moment t= 0.6 by means of a Fourier series of order 10 .

1) u(3 , 0.6) = -2.12677

2) u(3 , 0.6) = -2.95829

3) u(3 , 0.6) = -0.487423

4) u(3 , 0.6) = 4.00752

5) u(3 , 0.6) = 0.0346472

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EDP-01 for serial number: 80

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=-3\,(x-3)\,(x-2)\,x^2\,(x-\pi)^2 & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.4 by means of a Fourier series of order 9 .

1) u(1 , 0.4) = 3.29722

2) u(1 , 0.4) = 7.59604

3) u(1 , 0.4) = -2.44748

4) u(1 , 0.4) = 3.24818

5) u(1 , 0.4) = -1.77384

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -2x & 0\le x\le 1 \\ \frac{2x}{\pi-1}-\frac{2}{\pi-1}-2 & 1\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.3 by means of a Fourier series of order 9 .

1) u(2 , 0.3) = 4.2254

2) u(2 , 0.3) = -0.133124

3) u(2 , 0.3) = 1.96717

4) u(2 , 0.3) = -0.998868

5) u(2 , 0.3) = -1.73604

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EDP-01 for serial number: 81

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = -\left((x-1)\,x^2\,(x-\pi)\right) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.6 by means of a Fourier series of order 12 .

1) u(1 , 0.6) = 0.000179032

2) u(1 , 0.6) = 6.50458

3) u(1 , 0.6) = -7.19974

4) u(1 , 0.6) = 5.98292

5) u(1 , 0.6) = 2.93453

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -x & 0 \le x \le 2 \\ 6-4x & 2 \le x \le 3 \\ \frac{6x}{\pi-3} - \frac{18}{\pi-3} - 6 & 3 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = 3\,(x-1)\,x^2\,(x-\pi) & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 1
and the moment t= 0.2 by means of a Fourier series of order 12 .

1) u(1 , 0.2) = -1.11215

2) u(1 , 0.2) = -1.94086

3) u(1 , 0.2) = -6.78568

4) u(1 , 0.2) = 3.56956

5) u(1 , 0.2) = -7.08761

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ u(0,t)=u(3,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 9x & 0\le x\le 1 \\ 24-15x & 1\le x\le 2 \\ 6x-18 & 2\le x\le 3 \end{cases} & 0\le x\le 3 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$ and the moment $t=0.5$ by means of a Fourier series of order 12.

1) $u(1, 0.5) = -8.29144$

2) $u(1, 0.5) = -6.08624$

3) $u(1, 0.5) = 3.42771$

4) $u(1, 0.5) = 6.39204$

5) $u(1, 0.5) = 1.52342\times 10^{-6}$

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t)=u(2,t)=0 & 0\le t \\ u(x,0)=2(x-2)^2(x-1)x & 0\le x\le 2 \\ \frac{\partial}{\partial t}u(x,0)=3(x-2)^2(x-1)x & 0.\le x\le 2 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x=\frac{19}{10}$ and the moment $t=0.9$ by means of a Fourier series of order 12.

1) $u(\frac{19}{10}, 0.9) = 3.4632$

2) $u(\frac{19}{10}, 0.9) = -2.90864$

3) $u(\frac{19}{10}, 0.9) = -0.126296$

4) $u(\frac{19}{10}, 0.9) = -8.68027$

5) $u(\frac{19}{10}, 0.9) = -1.96973$

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = -\left((x-3)(x-1)\,x\,(x-\pi)^2\right) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=2$ and the moment $t=0.8$ by means of a Fourier series of order 11 .

1) $u(2, 0.8) = 0.0436832$

2) $u(2, 0.8) = -7.83177$

3) $u(2, 0.8) = 8.01294$

4) $u(2, 0.8) = 6.59035$

5) $u(2, 0.8) = -4.38274$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = -\left((x-3)\,x^2\,(x-\pi)^2\right) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=2$ and the moment $t=0.4$ by means of a Fourier series of order 11 .

1) $u(2, 0.4) = 4.64054$

2) $u(2, 0.4) = -2.18163$

3) $u(2, 0.4) = -3.7034$

4) $u(2, 0.4) = -1.85987$

5) $u(2, 0.4) = 3.00744$

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t)=u(2,t)=0 & 0\le t \\ u(x,0)=(x-2)^2\,(x-1)\,x & 0\le x\le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.2 by means of a Fourier series of order 9 .

1) u (1 , 0.2) = -0.00166057

2) u (1 , 0.2) = 3.75838

3) u (1 , 0.2) = 5.12674

4) u (1 , 0.2) = -1.32726

5) u (1 , 0.2) = -3.15936

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t)=u(4,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -8x & 0\le x\le 1 \\ 9x-17 & 1\le x\le 2 \\ 2-\frac{x}{2} & 2\le x\le 4 \end{cases} & 0\le x\le 4 \\ \frac{\partial}{\partial t}u(x,0)=-3\,(x-4)^2\,(x-3)\,x^2 & 0.\le x\le 4 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 3
and the moment t= 0.2 by means of a Fourier series of order 8 .

1) u (3 , 0.2) = 6.7487

2) u (3 , 0.2) = -0.900976

3) u (3 , 0.2) = 1.34345

4) u (3 , 0.2) = 8.57248

5) u (3 , 0.2) = 3.90026

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -3x & 0\le x\le 3 \\ \frac{9x}{\pi-3}-\frac{27}{\pi-3}-9 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.4 by means of a Fourier series of order 8 .

1) u(1 , 0.4) = 7.5968

2) u(1 , 0.4) = 2.89227

3) u(1 , 0.4) = 1.27537

4) u(1 , 0.4) = -8.72888

5) u(1 , 0.4) = -2.83883

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ u(0,t)=u(5,t)=0 & 0\le t \\ u(x,0)=-3\,(x-5)\,(x-2)\,x^2 & 0\le x\le 5 \\ \frac{\partial}{\partial t}u(x,0)=\begin{cases} -2x & 0\le x\le 2 \\ 5x-14 & 2\le x\le 3 \\ \frac{5}{2}-\frac{x}{2} & 3\le x\le 5 \end{cases} & 0.\le x\le 5 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 3
and the moment t= 0.2 by means of a Fourier series of order 8 .

1) u(3 , 0.2) = 53.3511

2) u(3 , 0.2) = -6.11685

3) u(3 , 0.2) = 1.4439

4) u(3 , 0.2) = 6.55862

5) u(3 , 0.2) = 7.7535

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = 2\,(x-3)\,x\,(x-\pi)^2 & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.8 by means of a Fourier series of order 8 .

1) u (1 , 0.8) = 5.30374

2) u (1 , 0.8) = -6.57473

3) u (1 , 0.8) = -0.45107

4) u (1 , 0.8) = 1.25799

5) u (1 , 0.8) = -8.34482

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} \frac{5x}{2} & 0 \le x \le 2 \\ -\frac{5x}{\pi-2} + \frac{10}{\pi-2} + 5 & 2 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = -2\,(x-3)\,x^2\,(x-\pi)^2 & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 2
and the moment t= 0.4 by means of a Fourier series of order 10 .

1) u (2 , 0.4) = 6.39499

2) u (2 , 0.4) = -2.59854

3) u (2 , 0.4) = 4.85048

4) u (2 , 0.4) = -8.33216

5) u (2 , 0.4) = -0.192748

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ u(0,t)=u(5,t)=0 & 0\le t \\ u(x,0)=\begin{cases} \frac{x}{2} & 0\le x\le 4 \\ 10-2x & 4\le x\le 5 \end{cases} & 0\le x\le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 3
and the moment t= 0.7 by means of a Fourier series of order 8 .

1) u(3 , 0.7) = 0.117754

2) u(3 , 0.7) = -2.47215

3) u(3 , 0.7) = 0.746336

4) u(3 , 0.7) = 5.17642

5) u(3 , 0.7) = 3.20606

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=-2(x-2)(x-1)x(x-\pi) & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 1. by means of a Fourier series of order 11 .

1) u(1 , 1.) = -0.527695

2) u(1 , 1.) = -3.0709

3) u(1 , 1.) = -1.56255

4) u(1 , 1.) = -4.35167

5) u(1 , 1.) = 0.817507

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t)=u(2,t)=0 & 0\le t \\ u(x,0)=2\,(x-2)\,(x-1)\,x & 0\le x\le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=\frac{3}{5}$ and the moment $t=0.4$ by means of a Fourier series of order 10 .

1) $u\left(\frac{3}{5}, 0.4\right) = -5.59615$

2) $u\left(\frac{3}{5}, 0.4\right) = -6.01781$

3) $u\left(\frac{3}{5}, 0.4\right) = 1.02062\times 10^{-7}$

4) $u\left(\frac{3}{5}, 0.4\right) = -3.02868$

5) $u\left(\frac{3}{5}, 0.4\right) = 3.80837$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=-\left((x-3)\,x^2\,(x-\pi)^2\right) & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=2$ and the moment $t=0.5$ by means of a Fourier series of order 8 .

1) $u(2, 0.5) = 3.82826$

2) $u(2, 0.5) = -2.17075$

3) $u(2, 0.5) = -3.03686$

4) $u(2, 0.5) = 4.49939$

5) $u(2, 0.5) = 0.682321$

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t) = u(2,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -9x & 0 \le x \le 1 \\ 9x - 18 & 1 \le x \le 2 \end{cases} & 0 \le x \le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = \frac{13}{10}$ and the moment $t = 0.3$ by means of a Fourier series of order 9.

1) $u(\frac{13}{10}, 0.3) = -3.80937$

2) $u(\frac{13}{10}, 0.3) = 6.24734$

3) $u(\frac{13}{10}, 0.3) = -0.00831096$

4) $u(\frac{13}{10}, 0.3) = -6.88377$

5) $u(\frac{13}{10}, 0.3) = 4.11457$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(5,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -6x & 0 \le x \le 1 \\ \frac{3x}{2} - \frac{15}{2} & 1 \le x \le 5 \end{cases} & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 3$ and the moment $t = 0.2$ by means of a Fourier series of order 8.

1) $u(3, 0.2) = 3.38795$

2) $u(3, 0.2) = 2.08932$

3) $u(3, 0.2) = -2.93221$

4) $u(3, 0.2) = -3.89055$

5) $u(3, 0.2) = 2.64435$

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EDP-01 for serial number: 90

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t)=u(4,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 6x & 0\le x\le 1 \\ 8-2x & 1\le x\le 4 \end{cases} & 0\le x\le 4 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 3
and the moment t= 0.5 by means of a Fourier series of order 9 .

1) u(3 , 0.5) = -4.23817

2) u(3 , 0.5) = -5.75638

3) u(3 , 0.5) = 5.34784

4) u(3 , 0.5) = 0.599321

5) u(3 , 0.5) = 0.0233181

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -4x & 0\le x\le 2 \\ \frac{8x}{\pi-2}-\frac{16}{\pi-2}-8 & 2\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.6 by means of a Fourier series of order 12 .

1) u(2 , 0.6) = 3.09309

2) u(2 , 0.6) = 3.12502

3) u(2 , 0.6) = -4.

4) u(2 , 0.6) = 0.0458089

5) u(2 , 0.6) = -1.52384

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ u(0,t)=u(1,t)=0 & 0\le t \\ u(x,0)=\begin{cases} 5x & 0\le x\le \frac{1}{5} \\ \frac{5}{3}-\frac{10x}{3} & \frac{1}{5}\le x\le \frac{4}{5} \\ 5x-5 & \frac{4}{5}\le x\le 1 \end{cases} & 0\le x\le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=\frac{1}{5}$ and the moment $t=0.4$ by means of a Fourier series of order 11.

1) $u(\frac{1}{5}, 0.4) = -2.46133$

2) $u(\frac{1}{5}, 0.4) = 6.33952$

3) $u(\frac{1}{5}, 0.4) = -6.37823$

4) $u(\frac{1}{5}, 0.4) = -5.32019$

5) $u(\frac{1}{5}, 0.4) = 0$

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ u(0,t) = u(1,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 10x & 0 \le x \le \frac{1}{2} \\ 20 - 30x & \frac{1}{2} \le x \le \frac{4}{5} \\ 20x - 20 & \frac{4}{5} \le x \le 1 \end{cases} & 0 \le x \le 1 \\ \frac{\partial}{\partial t} u(x,0) = \begin{cases} -20x & 0 \le x \le \frac{3}{10} \\ \frac{60x}{7} - \frac{60}{7} & \frac{3}{10} \le x \le 1 \end{cases} & 0. \le x \le 1 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x = \frac{4}{5}$ and the moment $t = 0.9$ by means of a Fourier series of order 9.

1) $u\left(\frac{4}{5}, 0.9\right) = 6.25619$

2) $u\left(\frac{4}{5}, 0.9\right) = -0.546324$

3) $u\left(\frac{4}{5}, 0.9\right) = -2.38908$

4) $u\left(\frac{4}{5}, 0.9\right) = -1.01762$

5) $u\left(\frac{4}{5}, 0.9\right) = 5.58228$

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -\frac{9x}{2} & 0\le x\le 2 \\ x-11 & 2\le x\le 3 \\ \frac{8x}{\pi-3}-\frac{24}{\pi-3}-8 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 1. by means of a Fourier series of order 9 .

1) u(2 , 1.) = -4.38304

2) u(2 , 1.) = -3.96968

3) u(2 , 1.) = 6.38601

4) u(2 , 1.) = -1.03172×10^{-10}

5) u(2 , 1.) = 7.19324

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -2x & 0\le x\le 3 \\ \frac{6x}{\pi-3}-\frac{18}{\pi-3}-6 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ \frac{\partial}{\partial t}u(x,0)=3(x-3)(x-2)x^2(x-\pi)^2 & 0.\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 1
and the moment t= 0.6 by means of a Fourier series of order 11 .

1) u(1 , 0.6) = 1.56629

2) u(1 , 0.6) = -2.27133

3) u(1 , 0.6) = -5.28918

4) u(1 , 0.6) = 8.19516

5) u(1 , 0.6) = 11.4186

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -8x & 0 \le x \le 1 \\ -\frac{x}{2} - \frac{15}{2} & 1 \le x \le 3 \\ \frac{9x}{\pi-3} - \frac{27}{\pi-3} - 9 & 3 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.7 by means of a Fourier series of order 12 .

1) u(2 , 0.7) = 3.67274

2) u(2 , 0.7) = 5.8238

3) u(2 , 0.7) = -0.540416

4) u(2 , 0.7) = -2.82516

5) u(2 , 0.7) = -2.75552

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t) = u(2,t) = 0 & 0 \le t \\ u(x,0) = -2(x-2)(x-1)x^2 & 0 \le x \le 2 \\ \frac{\partial}{\partial t}u(x,0) = \begin{cases} -2x & 0 \le x \le 1 \\ 2x-4 & 1 \le x \le 2 \end{cases} & 0. \le x \le 2 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= $\frac{9}{5}$
and the moment t= 0.9 by means of a Fourier series of order 9 .

1) u($\frac{9}{5}$, 0.9) = 0.115516

2) u($\frac{9}{5}$, 0.9) = -8.22627

3) u($\frac{9}{5}$, 0.9) = 1.1838

4) u($\frac{9}{5}$, 0.9) = 4.86657

5) u($\frac{9}{5}$, 0.9) = 1.22366

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -\frac{2x}{3} & 0\le x\le 3 \\ \frac{2x}{\pi-3}-\frac{6}{\pi-3}-2 & 3\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=1$ and the moment $t=0.2$ by means of a Fourier series of order 8.

1) $u(1,0.2) = -3.34055$

2) $u(1,0.2) = 8.77187$

3) $u(1,0.2) = 3.29441$

4) $u(1,0.2) = -2.01062$

5) $u(1,0.2) = -0.184393$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -5x & 0\le x\le 1 \\ -5 & 1\le x\le 2 \\ \frac{5x}{\pi-2}-\frac{10}{\pi-2}-5 & 2\le x\le \pi \end{cases} & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=2$ and the moment $t=0.5$ by means of a Fourier series of order 11.

1) $u(2,0.5) = 3.66857$

2) $u(2,0.5) = -0.897518$

3) $u(2,0.5) = -3.29501$

4) $u(2,0.5) = 0.53619$

5) $u(2,0.5) = 0.747588$

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ u(0,t)=u(3,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -2x & 0\le x\le 1 \\ 9x-11 & 1\le x\le 2 \\ 21-7x & 2\le x\le 3 \end{cases} & 0\le x\le 3 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.6 by means of a Fourier series of order 11 .

1) u(1 , 0.6) = -4.10497

2) u(1 , 0.6) = 0.163926

3) u(1 , 0.6) = -3.32396

4) u(1 , 0.6) = 5.24404

5) u(1 , 0.6) = 8.55142

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=3\,(x-3)\,(x-1)\,x\,(x-\pi) & 0\le x\le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.2 by means of a Fourier series of order 11 .

1) u(2 , 0.2) = 4.50176

2) u(2 , 0.2) = 1.64976

3) u(2 , 0.2) = 4.87685

4) u(2 , 0.2) = -0.805338

5) u(2 , 0.2) = 0.745453

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} 2x & 0 \le x \le 1 \\ -\frac{2x}{\pi-1} + \frac{2}{\pi-1} + 2 & 1 \le x \le \pi \end{cases} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.2 by means of a Fourier series of order 10 .

1) u(1 , 0.2) = 1.26014

2) u(1 , 0.2) = -2.27019

3) u(1 , 0.2) = -0.421383

4) u(1 , 0.2) = -7.69391

5) u(1 , 0.2) = -4.75966

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<3,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(3,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} -6x & 0 \le x \le 1 \\ 3x-9 & 1 \le x \le 3 \end{cases} & 0 \le x \le 3 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.9 by means of a Fourier series of order 10 .

1) u(2 , 0.9) = 4.69152

2) u(2 , 0.9) = -2.84975

3) u(2 , 0.9) = -3.67428

4) u(2 , 0.9) = 3.34714

5) u(2 , 0.9) = -1.58385

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t)=u(4,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -2x & 0\le x\le 2 \\ 4-4x & 2\le x\le 3 \\ 8x-32 & 3\le x\le 4 \end{cases} & 0\le x\le 4 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 1. by means of a Fourier series of order 12 .

1) u(2 , 1.) = -6.49053

2) u(2 , 1.) = -1.54308

3) u(2 , 1.) = 8.04957

4) u(2 , 1.) = 2.58212

5) u(2 , 1.) = -0.4458

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t)=u(4,t)=0 & 0\le t \\ u(x,0)=3(x-4)^2(x-1)x^2 & 0\le x\le 4 \\ \frac{\partial}{\partial t}u(x,0)=\begin{cases} \frac{5x}{2} & 0\le x\le 2 \\ 10-\frac{5x}{2} & 2\le x\le 4 \end{cases} & 0.\le x\le 4 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 2
and the moment t= 0.3 by means of a Fourier series of order 10 .

1) u(2 , 0.3) = -0.336936

2) u(2 , 0.3) = -3.89599

3) u(2 , 0.3) = -7.83821

4) u(2 , 0.3) = 47.3237

5) u(2 , 0.3) = 6.61745

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ u(0,t)=u(1,t)=0 & 0\le t \\ u(x,0)=\begin{cases} \frac{20x}{9} & 0\le x\le \frac{9}{10} \\ 20-20x & \frac{9}{10}\le x\le 1 \end{cases} & 0\le x\le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x=\frac{7}{10}$

and the moment $t=0.7$ by means of a Fourier series of order 12.

1) $u\left(\frac{7}{10},0.7\right) = 7.91813$

2) $u\left(\frac{7}{10},0.7\right) = -2.19266$

3) $u\left(\frac{7}{10},0.7\right) = -8.77147$

4) $u\left(\frac{7}{10},0.7\right) = 0$

5) $u\left(\frac{7}{10},0.7\right) = 5.45783$

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t)=\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t)=u(4,t)=0 & 0\le t \\ u(x,0)=-3(x-4)(x-1)x & 0\le x\le 4 \\ \frac{\partial}{\partial t}u(x,0)=\begin{cases} 3x & 0\le x\le 2 \\ 30-12x & 2\le x\le 3 \\ 6x-24 & 3\le x\le 4 \end{cases} & 0.\le x\le 4 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x=3$

and the moment $t=0.1$ by means of a Fourier series of order 11.

1) $u(3,0.1) = 5.63518$

2) $u(3,0.1) = 5.00406$

3) $u(3,0.1) = -1.10381$

4) $u(3,0.1) = 17.3628$

5) $u(3,0.1) = -7.08254$

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t) = u(4,t) = 0 & 0 \le t \\ u(x,0) = \begin{cases} \frac{x}{3} & 0 \le x \le 3 \\ 4-x & 3 \le x \le 4 \end{cases} & 0 \le x \le 4 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x = 1 and the moment t = 1. by means of a Fourier series of order 9 .

1) u(1 , 1.) = -1.84286

2) u(1 , 1.) = -4.46182

3) u(1 , 1.) = 0.691232

4) u(1 , 1.) = -3.37908

5) u(1 , 1.) = 0.00209723

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = (x-3)\,x^2\,(x-\pi) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x = 1 and the moment t = 0.7 by means of a Fourier series of order 10 .

1) u(1 , 0.7) = 2.40747

2) u(1 , 0.7) = 3.00308

3) u(1 , 0.7) = -4.35882

4) u(1 , 0.7) = -2.71585

5) u(1 , 0.7) = 0.577084

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Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t)=u(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -\frac{8x}{3} & 0\le x\le 3 \\ \frac{8x}{\pi-3}-\frac{24}{\pi-3}-8 & 3\le x\le \pi \\ 0 & \text{True} \end{cases} & 0\le x\le \pi \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.1 by means of a Fourier series of order 10 .

1) u(1 , 0.1) = 6.92858

2) u(1 , 0.1) = -1.75323

3) u(1 , 0.1) = -0.787937

4) u(1 , 0.1) = 5.8844

5) u(1 , 0.1) = 2.26222

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t)=9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t)=\frac{\partial u}{\partial x}(\pi,t)=0 & 0\le t \\ u(x,0)=\begin{cases} -9x & 0\le x\le 1 \\ 6x-15 & 1\le x\le 2 \\ \frac{3x}{\pi-2}-\frac{6}{\pi-2}-3 & 2\le x\le \pi \\ 0 & \text{True} \end{cases} & 0\le x\le \pi \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.1 by means of a Fourier series of order 12 .

1) u(1 , 0.1) = -4.35472

2) u(1 , 0.1) = -0.204014

3) u(1 , 0.1) = 2.24319

4) u(1 , 0.1) = 3.20363

5) u(1 , 0.1) = -1.00595